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LAMBTON TGS: VIBRATION MONITORING ON HIGH ENERGY PIPING

Report No 88-315-K

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Mechanical Research Department

ABSTRACT

A vibration measurement program was undertaken on the high energy piping at Lambton TGS, Unit 3, as part of the Lambton Life Assurance Project. The purpose of the project was to provide data to Mechanical Design Department for use in the assessment of the life expectancy of the piping. The details of the vibration measurement program, including measurement locations, data acquisition and analysis techniques, and the results of the program are documented in the report.

job	file	date	report no.
740627-030-100	825.5	February 28, 1989	88-315-K

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EXECUTIVE SUMMARY

LAMBTON TGS: VIBRATION MONITORING ON HIGH ENERGY PIPING

Report No 88-315-K

H.L. Anderson, Engineer
M. deMontmorency, Technologist
Plant Equipment Dynamics Section
Mechanical Research Department

A study of vibration under transient and steady state operating conditions has been performed on the high energy piping systems at Lambton TGS, Unit 3. The study was performed as part of the Lambton Life Assurance Project to provide data to Mechanical Design Department for use in assessment of the piping life expectancy.

Main steam and loop piping, cold reheat piping, and hot reheat piping comprised the high energy system. The vibration levels under the transient and full load conditions monitored were found to be very low and at very low frequencies. No significant transient vibration response was observed under the conditions studied.

job	file	date	report no.
740627-030-100	825.5	February 28, 1989	88-315-K

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To Mr. R. Moleschi
Supervising Project Engineer
Generation Engineering Management

LAMBTON TGS: VIBRATION MONITORING ON HIGH ENERGY PIPING

1. INTRODUCTION

A vibration measurement program was undertaken on the high energy piping at Lambton TGS, Unit 3, as part of the Lambton Life Assurance Project. Main steam piping, cold reheat piping, hot reheat piping, and loop piping comprised the high energy piping system. The purpose of the vibration measurement program was to provide data to the Mechanical Design Department of Design and Development Division for use in assessment of the piping life expectancy.

The report will document the type and location of the vibration measurements taken, the conditions under which the data was obtained and the program results.

2.0 VIBRATION MEASUREMENT PROCEDURE

The piping vibration measurement program was designed to comply whenever possible with the Design & Construction Requirements, section 1.08.04/1,2/.

The requirements stipulate that two types of vibration measurements be undertaken:

(a) displacement measurement for vibration at frequencies less than approximately 100 Hz, bending mode vibration;

(b) acceleration measurements for high frequency, shell mode vibration in excess of 100 Hz.

The shell mode or pipe wall vibration measurements required that the vibration transducers be mounted directly on the wall of the piping which operates at a temperature of 540°C. Standard accelerometers would not tolerate temperatures in excess of 250°C. The cost of high temperature transducers for measuring shell modes was not considered justified for this program since vibration was anticipated to be primarily in the bending mode. The systems consist of long spans with relatively few supports. Thus, lower frequency bending mode vibration would be expected to be the dominant form of the piping response.

The bending mode vibration measurements were made by mounting accelerometers on the piping insulation cladding. On piping with rigid insulation and galvanized cladding the accelerometers were magnetically mounted on the cladding. On piping sections that had been reinsulated and clad with a corrugated aluminum cladding the accelerometers were mounted on galvanized bands that had been tightly fixed to the aluminum. The insulation on the piping sufficiently reduced the temperature experienced by the accelerometers to approximately 50°C which was well within the operating range of standard accelerometers; however, some problems were encountered with thermal gradients experienced by the accelerometers which will be discussed in Section 2.1.

Bending mode vibration was monitored on the two main steam lines in Unit 3 under transient and steady state conditions. In the transient case the instrumentation was fixed on the pipes at three elevations on the long vertical runs. The steady state monitoring, performed at 500 MW, consisted of a survey at several points along the length of the piping.

The layout of the main steam piping in Unit 3 is shown in Figure 1, together with the monitoring locations for the steady state vibration survey.

2.1 Transient Monitoring

The transient monitoring was performed under the following operating conditions:

(i) 150 MW runback test on 88/09/14;
(ii) 400MW: Emergency Stop Valve (ESV) and reheat valve tests on 88/09/29.

The transient monitoring locations on the north and south lines, shown with the instrumentation set-up in Figure 2, spanned the vertical run of piping between elevations 678' and 734'. Two accelerometers were mounted to monitor the north-south and east-west vibration at three locations on each line.

In the 150 MW runback tests B&K 4370 accelerometers were used at each monitoring location. The signals from the accelerometers were recorded in acceleration on magnetic tape and integrated later in the laboratory to produce the required displacement data.

Displacement was directly monitored in the 150 MW tests by a Genisco pull-wire potentiometer mounted in the north-south direction on the south main steam line at elevation 678 ft. Extensive damage attributed to large transverse movement of the piping during transient conditions had been previously observed at hangers HC27 and HC7, above elevation 678 ft. The pull wire potentiometer, sized for 30 in (0.762m) measurements was used for monitoring the transients. The pull wire potentiometer was clamped to a floor grating with a 52 inch (1.3m) arm length to the pipe.

Analysis of the 150 MW runback test data revealed that:

(i) The vibration levels were extremely low level, less than 1.0 mm rms, and no short term transient was detected;

(ii) The B&K accelerometers displayed low frequency signal drift induced by air temperature gradients in the vicinity of the pipe. The signal drift was of the same order of magnitude and in the same frequency range as the piping motion.

The two features of the 150 MW vibration listed above made the analysis of the data difficult and time consuming. In the ESV and reheat valve tests the modifications outlined below were made to the instrumentation.

Modification 1: The B&K 4370 accelerometers at locations 10, 11 and 12 on the south line were replaced by Endevco 7705/100 accelerometers with the following features:

- Ten times the sensitivity of the B&K 4370's, enabling more accurate measurement of the low level signals;
- Significantly reduced sensitivity to thermal gradients which was determined by testing both types of accelerometers in the laboratory on a shaker while inducing thermal gradients in the vicinity with a heat gun.

Modification 2: A pull-wire potentiometer was installed in the E-W direction on the south line. The potentiometer was bolted to a block mounted on the floor.

Modification 3: All accelerometers were insulated to reduce the thermal gradient effect.

In the 400 MW ESV and reheat valve tests no transient vibration of note was experienced by the piping.

In both the 150 MW and 400 MW tests the vibration levels and frequencies were so low that the analysis of the accelerometer data by double integration from the tape required extreme care with filtering to avoid the introduction of extraneous noise signals. One additional problem was that the commercially available integrator circuits contained 1.0 Hz filters which introduced ringing problems with the low frequency (0.4 Hz - 1.2 Hz) main steam line data. The integrator filter problem was alleviated by processing the data at twice the speed of recording and comparing the results with the pull-wire potentiometer data which was recorded directly in displacement.

2.2 <u>500 MW Steady State Monitoring</u>

The 500 MW surveys of the main steam, hot reheat, cold reheat, and loop piping were performed using three Endevco 7705-1000 accelerometers orthogonally mounted on a magnetic block.

The piping layouts with measurement locations are documented in Figure 1, Figures

3 and 4, and Figures 5 and 6 for the main steam and loop piping, hot reheat piping, and cold reheat piping respectively.

In the 500 MW surveys of the main steam, cold reheat, hot reheat, and loop piping the integrator problem was eliminated by building a special integrator box with a 0.2 Hz lower cut-off frequency. The signals from the accelerometers were integrated to displacement prior to recording directly in displacement on tape.

3. RESULTS AND DISCUSSION

The data for the 150 MW and 400 MW tests were affected by thermal gradients on the B&K 4370 accelerometers and integrator problems with the associated signal conditioning equipment which resulted in distortion of the vibration signals. The data presented has been filtered to mitigate the effects of electronic noise; however, all data for the 150 and 400 MW tests should be treated as upper-bound estimates of piping vibration levels. All displacement data are quoted in 0 to peak format as specified in Reference 1.

The peak displacement data from the main steam lines taken during the 150 MW runback tests, and the 400 MW ESV and reheat valve tests are documented in Table 1 and Table 2 respectively.

The maximum peak displacement measured over the course of all monitoring performed occurred during the 150 MW runback tests on the south main steam line in the east-west direction at elevation 678. Peak displacement of 13.8 mm was recorded at this position just prior to the cut back in power. As previously noted, the value of 13.8 mm peak is conservative, ie., an upper bound. The rest of the transient test displacement data ranged from approximately 1.5 to 7mm peak. No significant transient excursions were observed on the piping.

The maximum peak and overall rms displacement data for the 500 MW vibration survey of the main steam, hot and cold reheat and loop piping are documented in Tables 3 through 6. The maximum peak displacements range from approximately 0.2mm to 5.0 mm peak. The vertical vibration levels were the lowest measured, on both the horizontal and vertical runs of piping. The overall rms displacement values, calculated over the frequency range 0 to 10 Hz, range from 0.04 mm to 1.4 mm. The dominant frequencies of vibration for each line and each direction are listed in Table 7. The complete set of spectra for the 500 MW tests comprise Appendix A.

4. SUMMARY

The piping vibration data from the high energy piping at Lambton TGS have been documented in this report and are submitted for use in the assessment of the life expectancy of the systems which is part of the Lambton Life Assurance Program.

The low level, low frequency motion detected in the high energy systems under the conditions tested required a great deal of care with the data acquisition instrumentation and analysis. Any questions or comments regarding the data should be directed to the authors.

Approved:

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REFERENCES

1. Memo to Mr. V. Miller from A.Y. Cheung, "Lambton TGS Vibration Monitoring of High Energy Piping", file 903.11 NA27-36000 T5, June 23, 1988.

2. Memo to Mr. L. Chen from H.L. Anderson, "Lambton TGS: Vibration Monitoring on Main Steam and Steam Reheat Lines", file 825.5(T5), July 5, 1988.

TABLE 1

LAMBTON TGS UNIT 3 150 MW RUNBACK TEST

MAIN STEAM LINE

PEAK DISPLACEMENT IN μm

LINE	Elev.	North-South	East-West
north	722	3000	1600
north	710	2200	1800
north	678	2000	-
south	734	2000	2600
south	710	1600	3200
south	678	1100	-

TABLE 2

LAMBTON TGS UNIT 3 400 MW ESV TESTS

MAIN STEAM LINE

PEAK DISPLACEMENT IN μm

LINE	Elev.	North-South	East-West
north	710	4600	2800
north	678	4000	-
south	710	6000	3000
south	678	2200	1600

TABLE 3

LAMBTON TGS UNIT 3 500 MW VIBRATION SURVEY

MAIN STEAM LINE

NORTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
747	B	n/a	n/a	4350	1210	2810	822
747	A	353	82.0	2650	637	3040	707
710		269	63	1390	390	2820	846
678		227	52.9	1890	499	3870	973
628		297	71.4	818	227	1750	469

SOUTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
747	B	415	46.7	1700	396	2170	582
747	A	220	49.4	2200	600	1680	411
734		216	54	3370	1030	1830	512
710		311	65	2100	622	1970	524
678		405	84	1640	482	2580	607
628	hanger					-	445

TABLE 4

LAMBTON TGS UNIT 3 500 MW VIBRATION SURVEY

LOOP PIPING

DISPLACEMENT IN μm

LOOP	PIPE	E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms
	1	272	69	472	106
	2	577	39	342	80
	3	175	47	280	73
	4	195	46	353	75

TABLE 5

LAMBTON TGS UNIT 3 500 MW VIBRATION SURVEY

HOT REHEAT PIPING

NORTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
756	B	-	-	2150	477	-	211
756	A	200	37	2330	640	2730	724
708	hanger	-	-	2190	526	2990	811
675	hanger	-	-	1980	485	2970	861
609	hanger	-	-	1000	211	2810	775

SOUTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
756	A	138	28	1550	299	2890	739
734		236	50	4650	1370	2820	789
708		-	-	3970	1090	2500	709
675		-	-	2750	847	2290	582
628		223	47	1300	297	1960	532
600	B	211	48	384	93	3190	670
605	C	-	-	-	60	-	41

TABLE 6

LAMBTON TGS UNIT 3 500 MW VIBRATION SURVEY

COLD REHEAT LINES

NORTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
715	A	-	-	-	-	842	214
710		-	-	2400	611	2820	675
673		-	-	1790	408	-	507
628		-	-	1380	381	928	202
600	B	445	95	2270	465	2280	572
600	C	282	62	1590	422	965	230

SOUTH LINE DISPLACEMENT IN μm

El.	Pos.	VERTICAL		E-W		N-S	
		max. pk.	o/a rms	max. pk.	o/a rms	max. pk.	o/a rms
715	B	-	-	884	239	-	-
715	A	-	-	1770	410	-	-
710		-	-	2830	632	2220	452
672		-	-	1940	412	1330	292
628		-	-	1480	380	1040	260
600	C	-	-	1930	412	2000	476
600	D	205	38	1720	412	624	140
600	E	-	-	802	177	758	151

TABLE 7

LAMBTON TGS UNIT 3 500 MW VIBRATION SURVEY

DOMINANT FREQUENCIES

SYSTEM	DIRECTION	DOMINANT FREQUENCIES in Hz
main steam	vertical	0.462, 0.641, 0.667, 1.128
main steam	east-west	0.462, 0.641, 0.667, 0.872, 1.0, 1.128, 1.231
main steam	north-south	0.41, 0.462, 0.487, 0.641, 0.667, 0.872, 0.897, 1.128, 1.205
hot reheat	vertical	0.615, 0.641
hot reheat	east-west	0.59, 0.615, 0.641, 0.692, 0.718, 0.872, 0.897
hot reheat	north-south	0.436, 0.615, 0.641, 0.692, 0.872
cold reheat	vertical	0.718, 0.795, 1.3
cold reheat	east-west	0.641, 0.846, 0.872, 1.154, 1.23, 1.256, 1.308, 1.462
cold reheat	north-south	0.692, 0.824,0.846, 0.872, 1.154, 1.18, 1.31, 1.487
loop piping	east-west	1.128, 1.256, 1.641
loop piping	north-south	1.82, 1.872, 2.59, 3.2

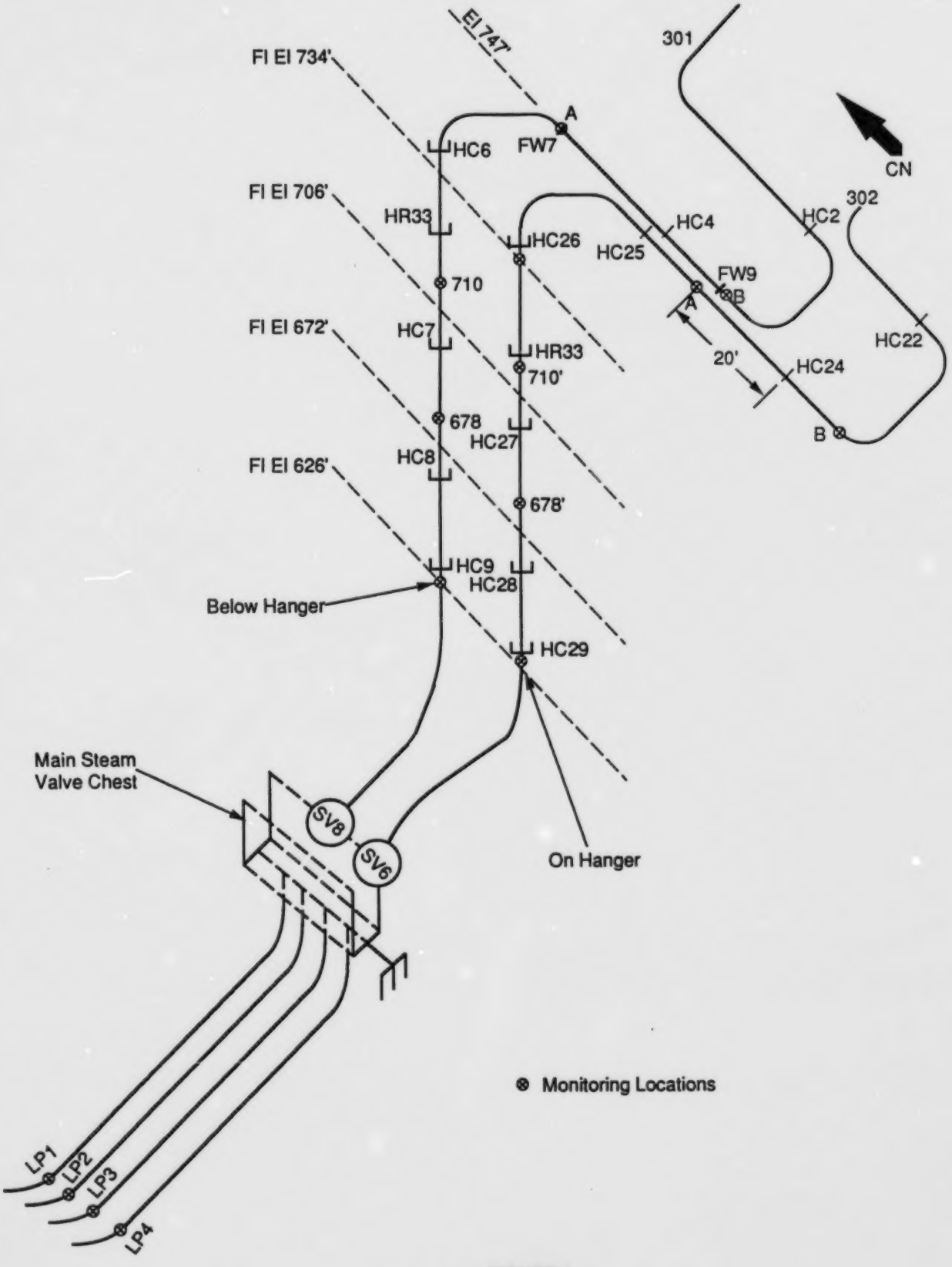
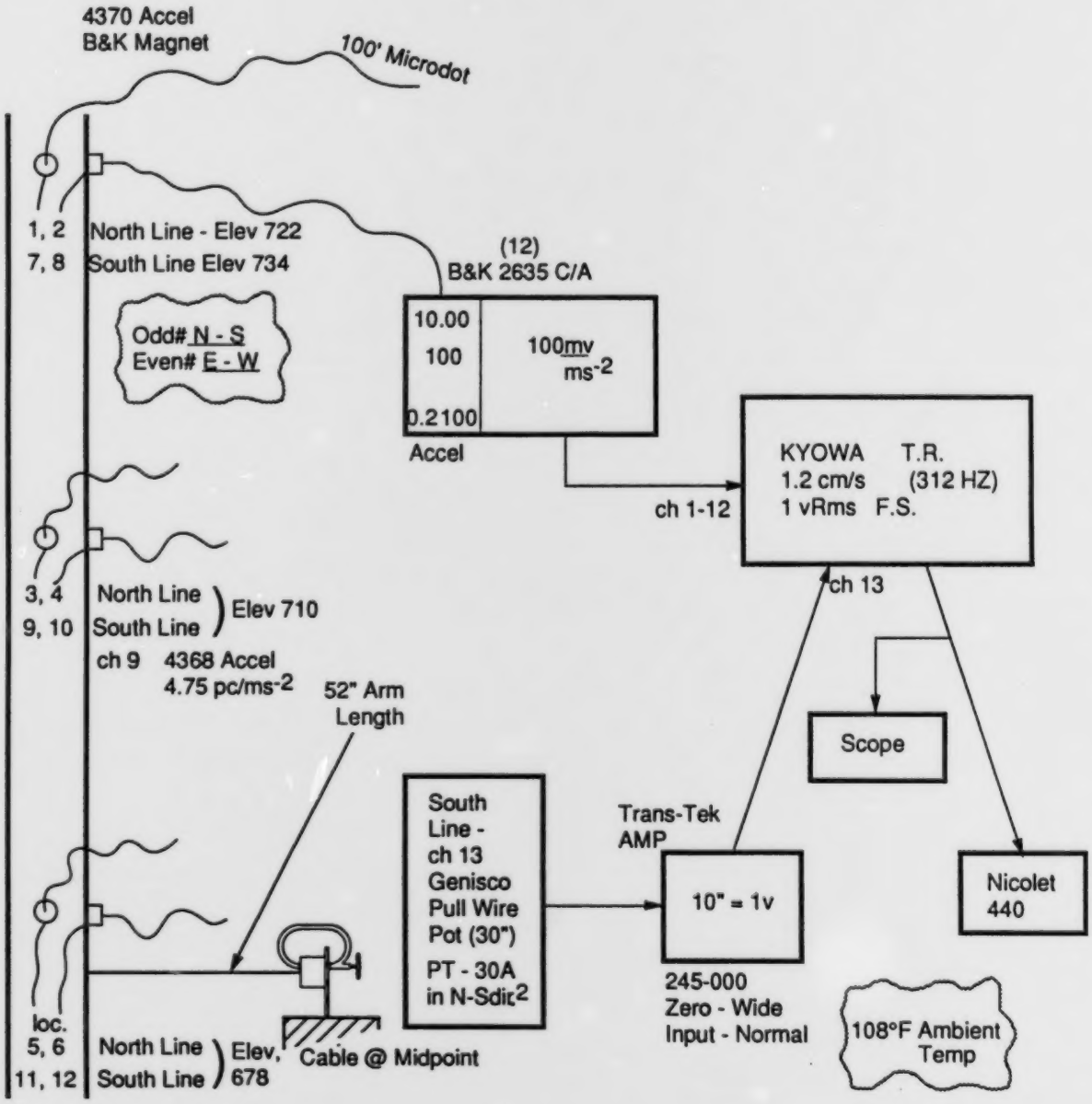


FIGURE 1
MAIN STEAM PIPING - UNIT 3

88-315



Sept 29/88 - Substitute 3-Endvco 7705-1000 @ ch 10, 11, 12 (1000pc/ms^2) c/A @ 10 $\frac{mv}{ms^{-L}}$ Out
- Substitute 4370 @ ch 9
- Add 2nd Pull Wire Pot @ LOC 12 - ch 14 on Tape

FIGURE 2

LAMBTON U3 MAIN STEAM TRANSIENT MEASUREMENT LOCATIONS

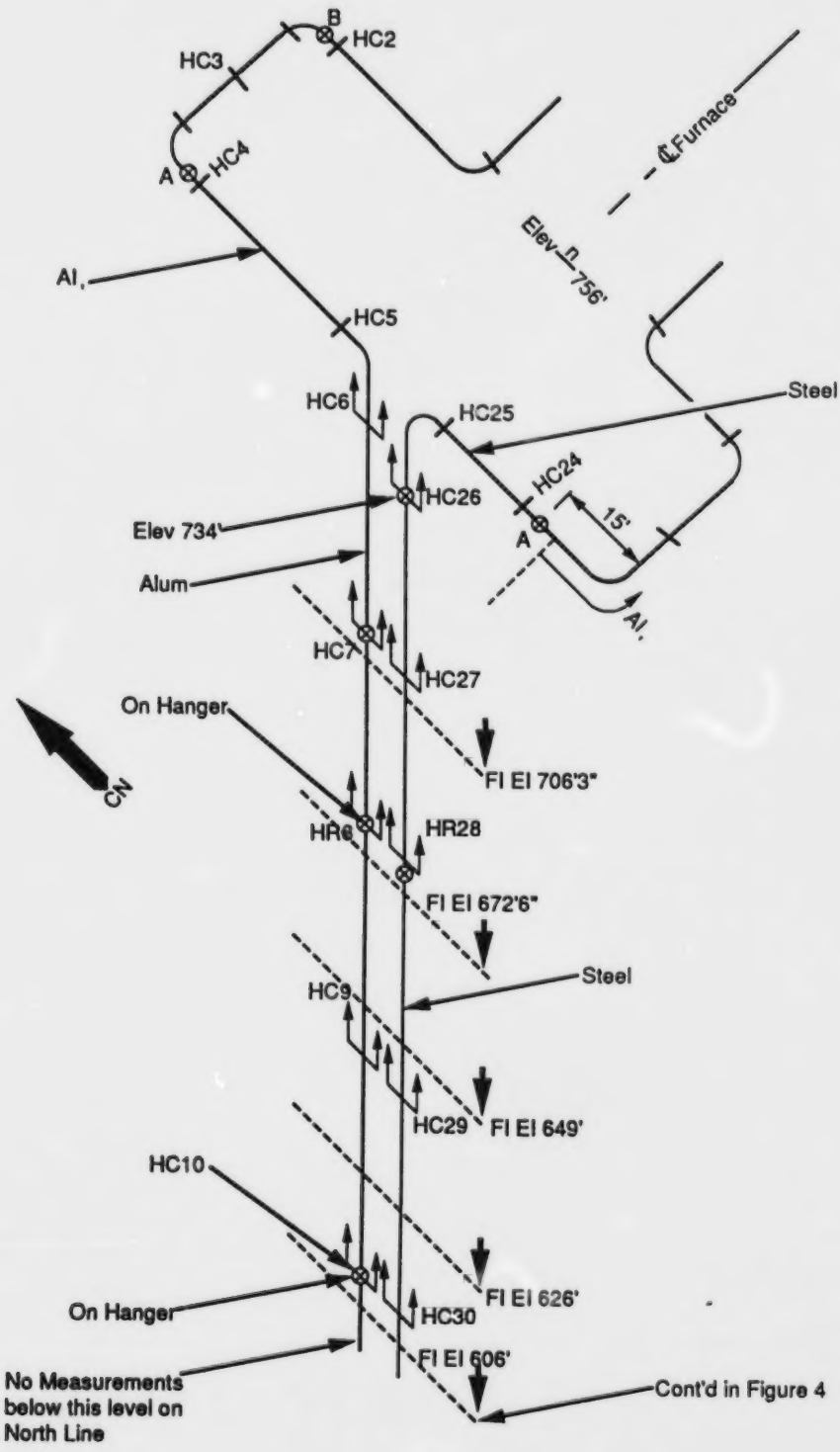
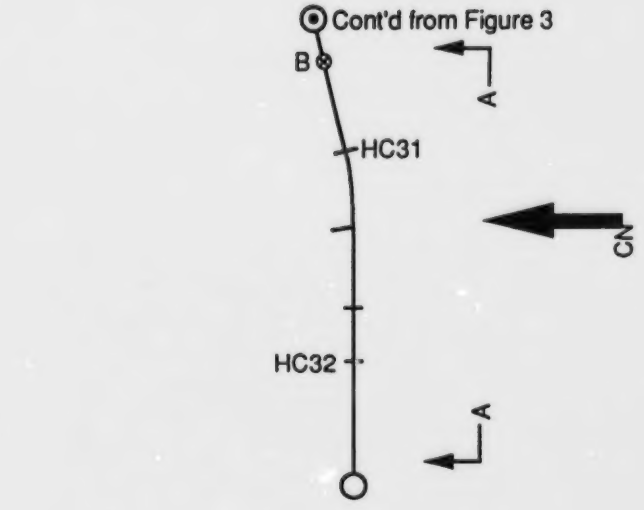
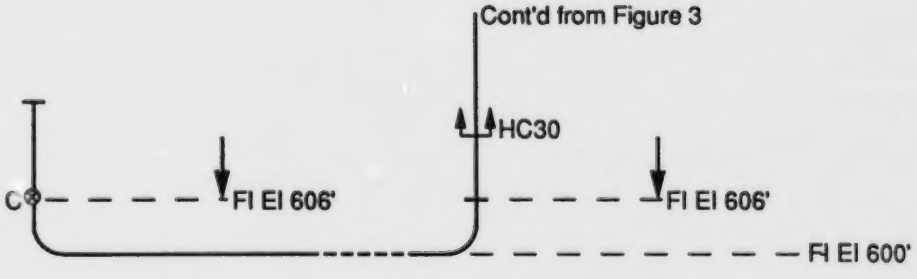


FIGURE 3
HOT REHEAT PIPING





View A-A

FIGURE 4
CONTINUATION OF HOT REHEAT SOUTH LINE
BELOW 606'

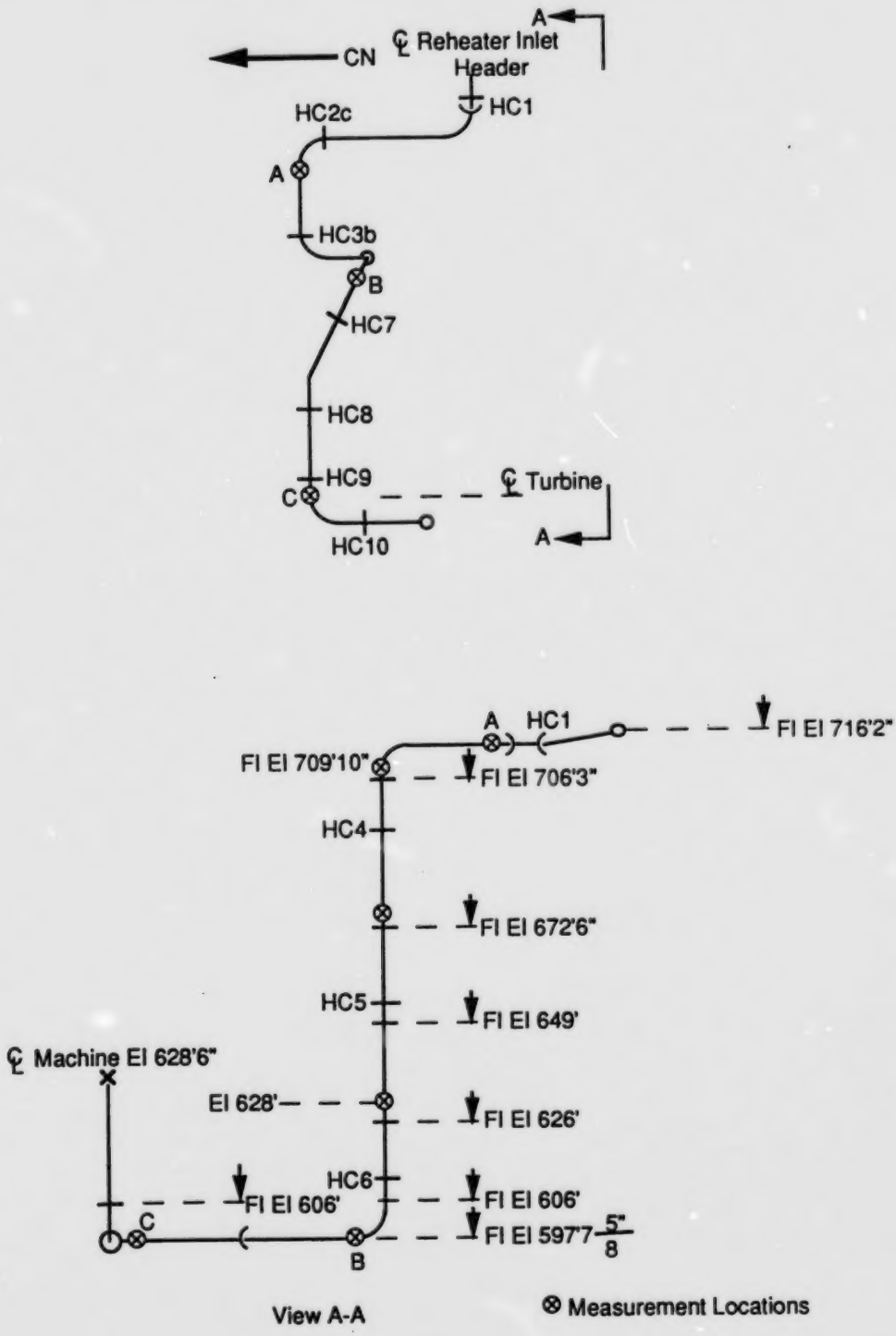


FIGURE 5
COLD REHEAT NORTH - UNIT 3

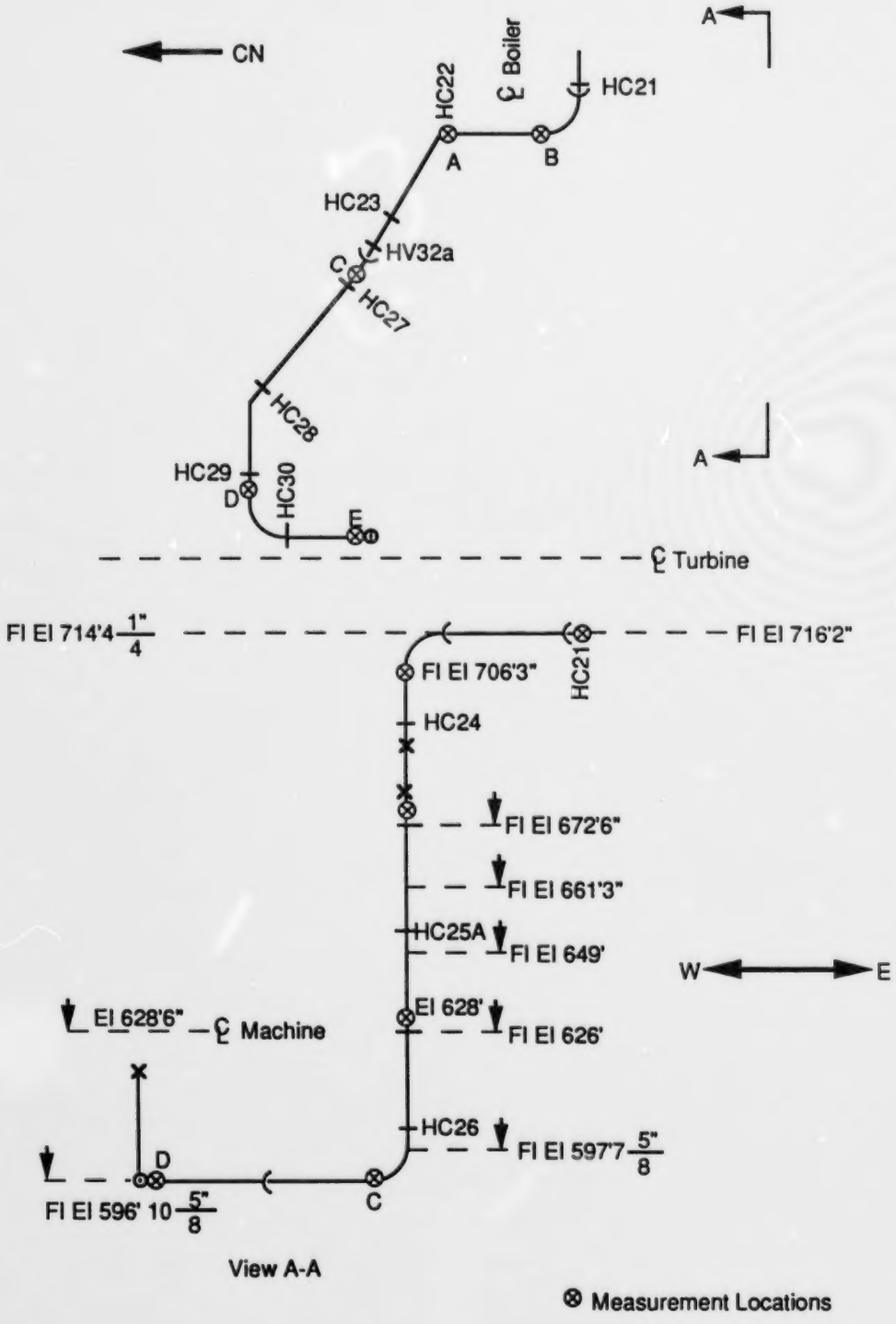


FIGURE 6
COLD REHEAT SOUTH - UNIT 3

APPENDIX A

DISPLACEMENT SPECTRA FROM 500 mW SURVEY

FIGURE A1

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 Vertical
PROCESS CONDITION : Main Steam - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	33.75
2	1.128	20.06
3	0.462	14.30
4	1.231	13.06
5	5.564	9.78

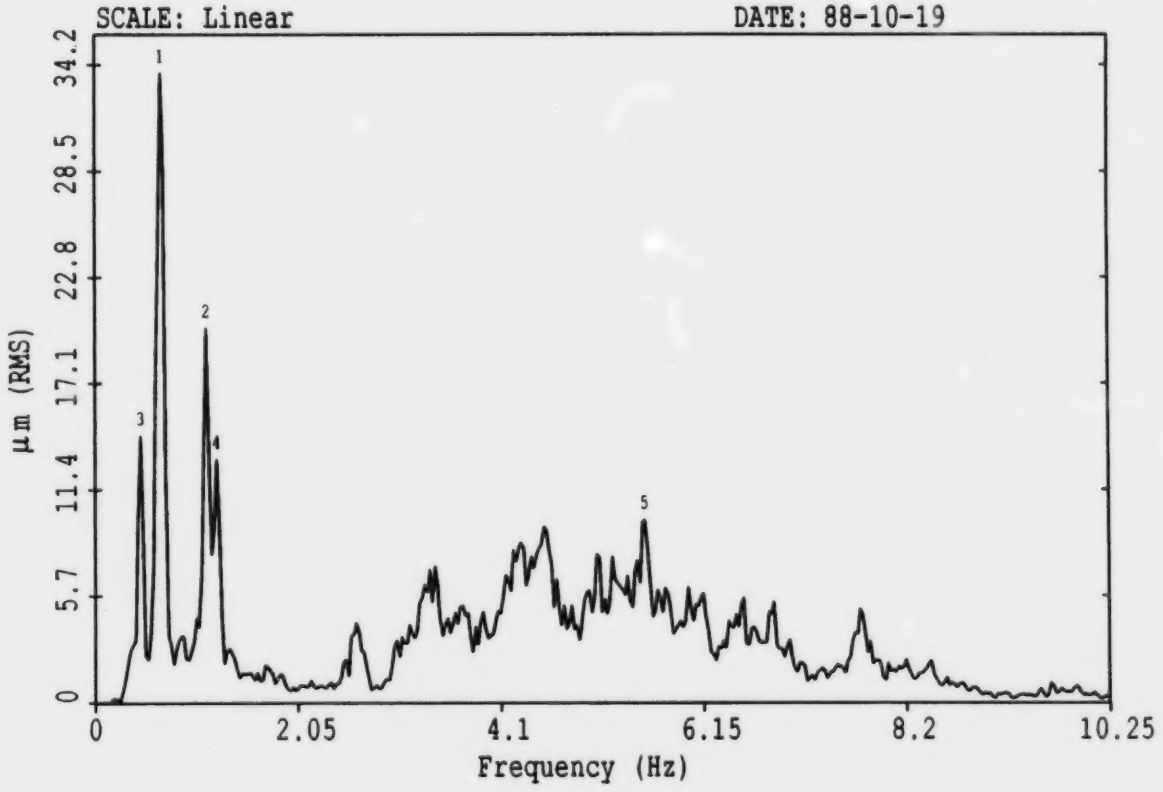


FIGURE A2

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 Vertical
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	17.90
2	4.820	10.47
3	6.154	9.34
4	4.718	9.28
5	4.872	9.00

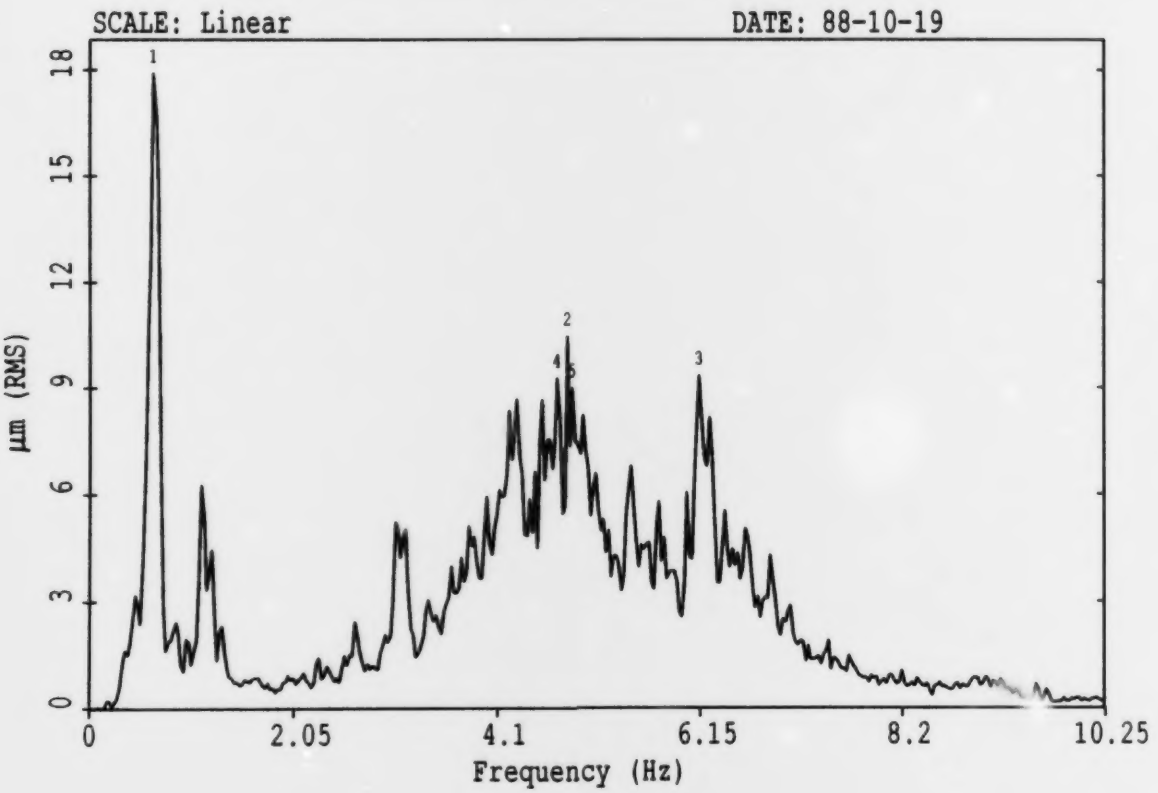


FIGURE A3

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 Vertical
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	10.36
2	5.487	8.56
3	4.820	8.40
4	4.590	7.79
5	6.308	7.40

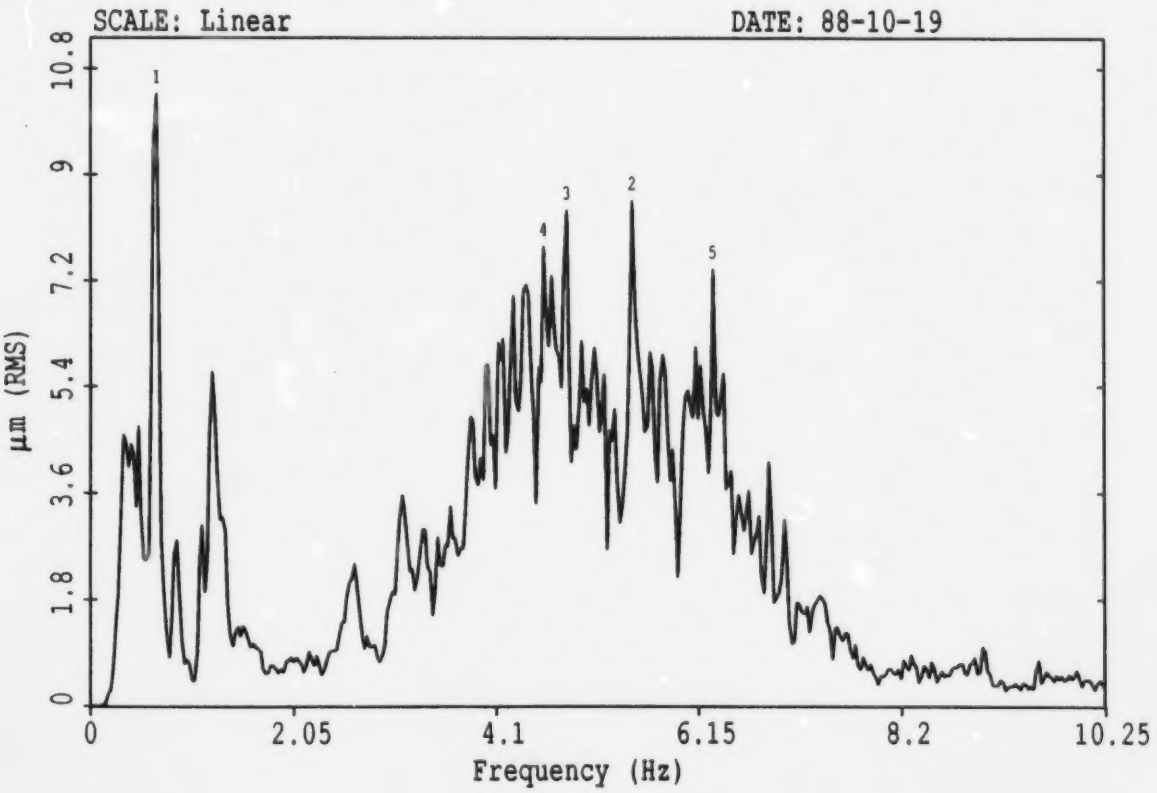


FIGURE A4

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 Vertical
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	27.43
2	0.667	24.80
3	0.872	11.87
4	4.385	11.12
5	4.820	10.10

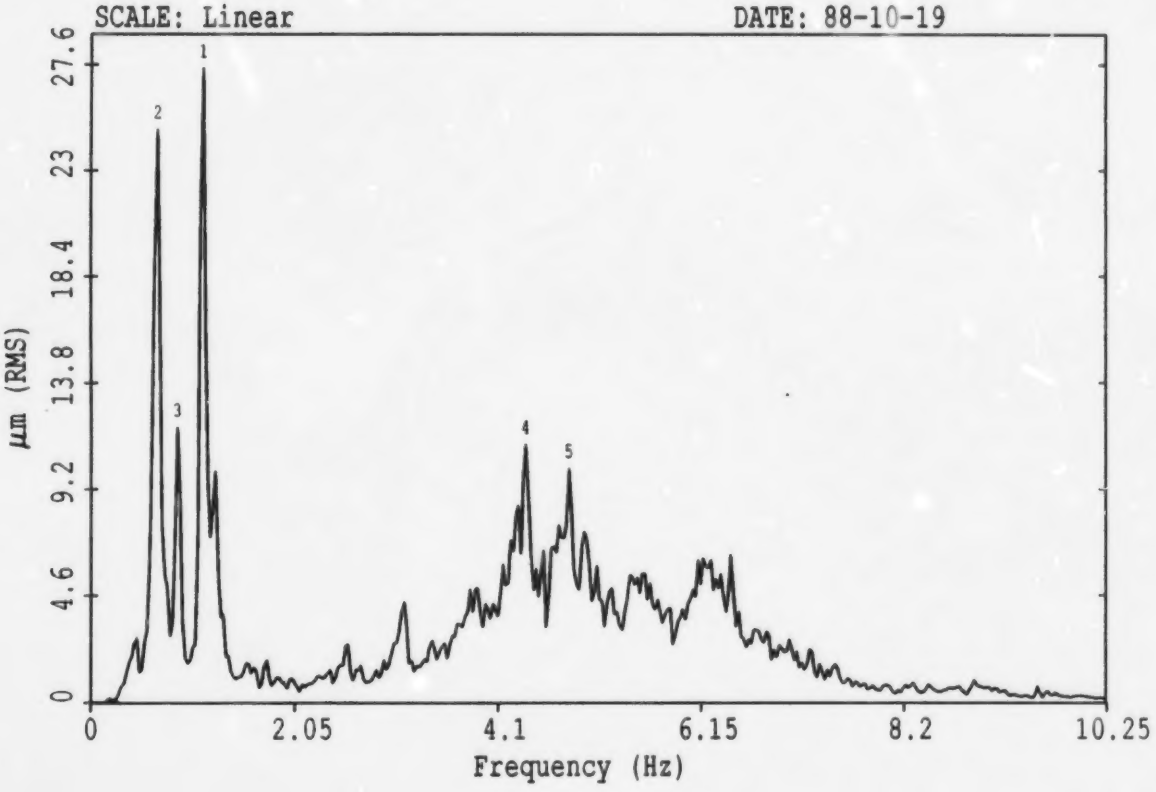


FIGURE A5

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 East-West
PROCESS CONDITION : Main Steam - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	348.10
2	1.231	226.50
3	0.462	220.50
4	1.128	117.30
5	0.872	30.73

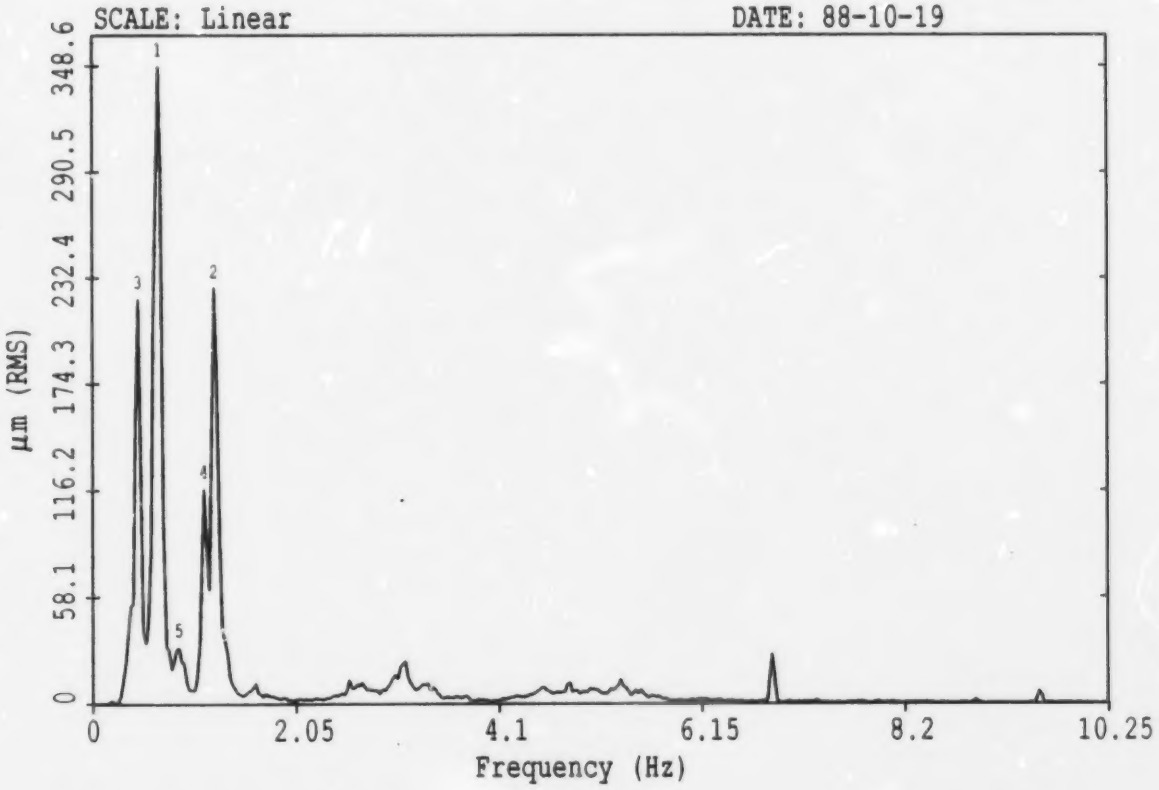


FIGURE A6

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 East-West
PROCESS CONDITION : Main Steam - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	838.50
2	1.128	203.20
3	1.231	110.80
4	0.897	94.71
5	0.410	65.71

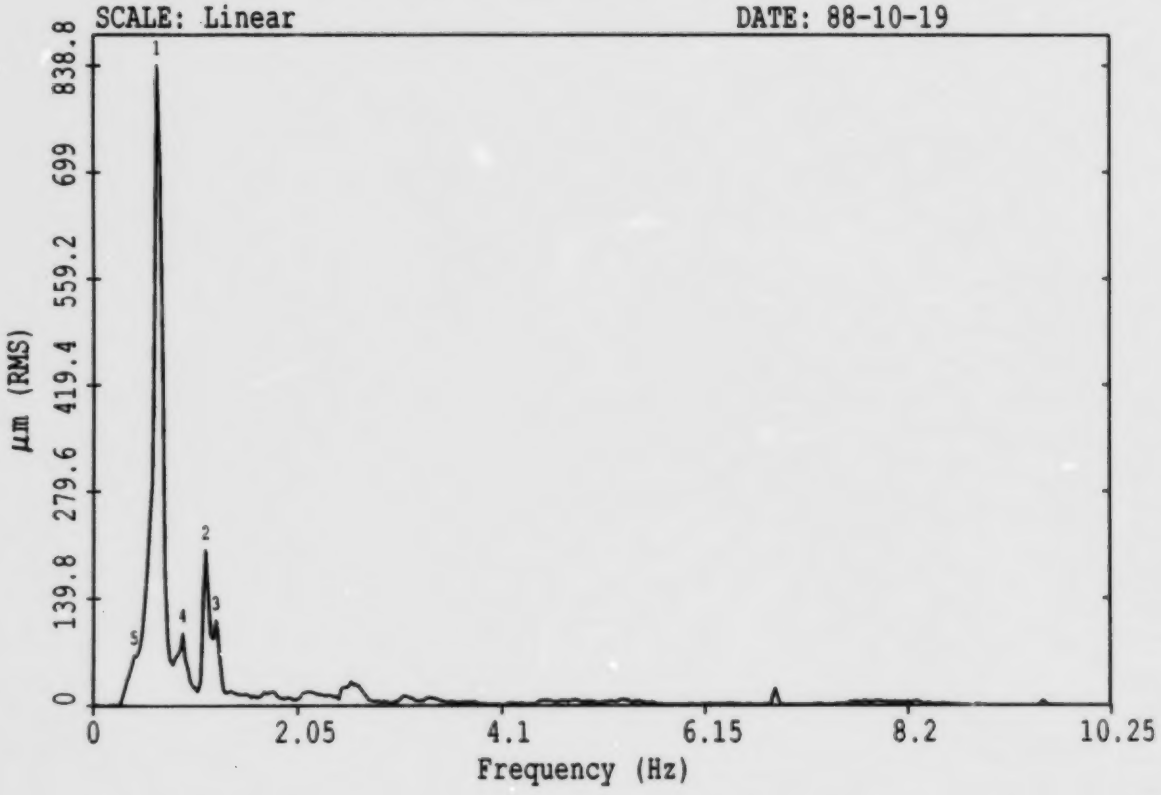


FIGURE A7

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 East-West
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	205.60
2	0.462	123.80
3	1.128	55.96
4	1.231	55.66
5	0.795	31.61

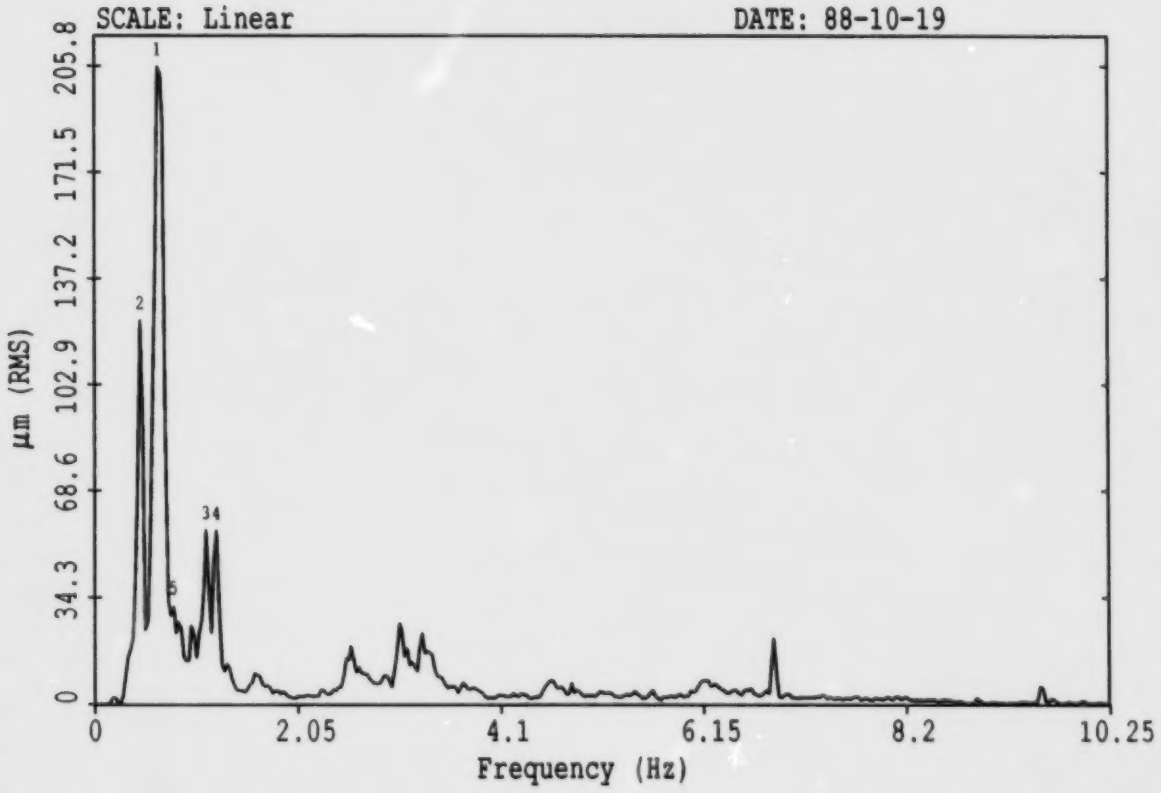


FIGURE A8

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 East-West
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	257.10
2	1.128	211.80
3	1.231	189.40
4	0.462	58.05
5	1.000	24.38

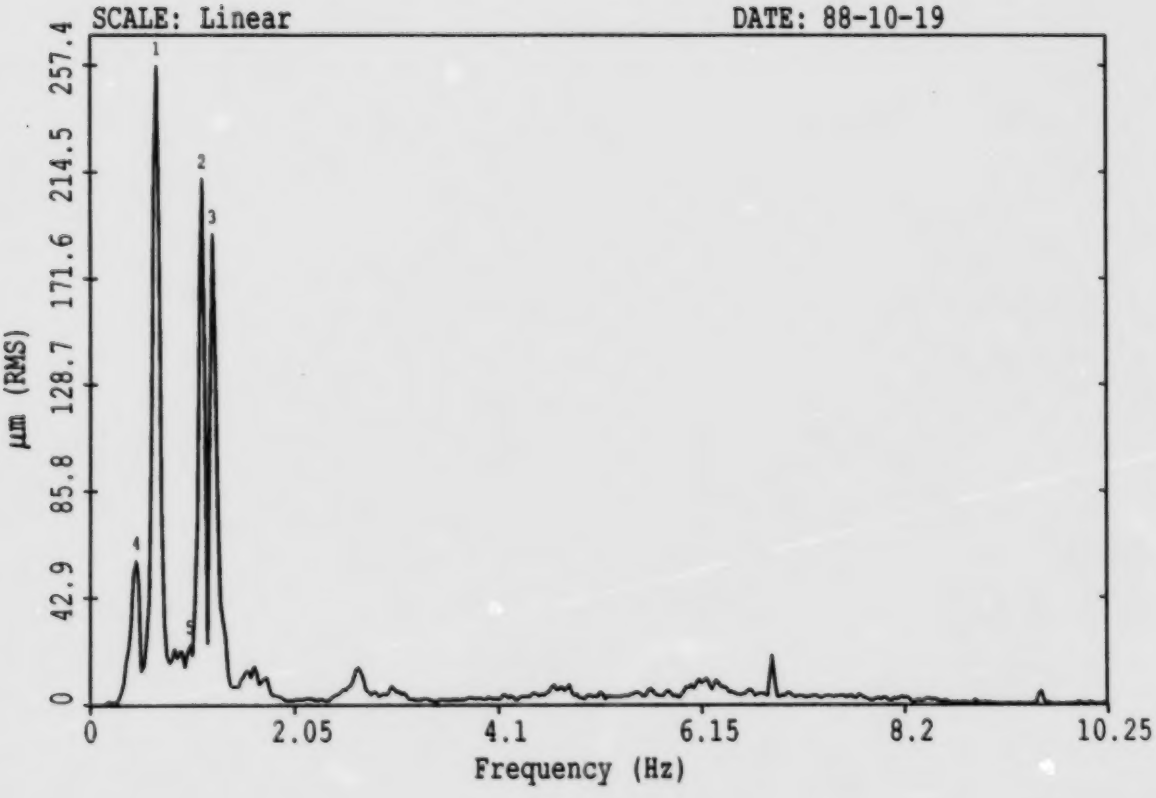


FIGURE A9

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 East-West
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	130.10
2	0.667	92.99
3	1.256	52.31
4	0.872	37.90
5	0.462	15.99

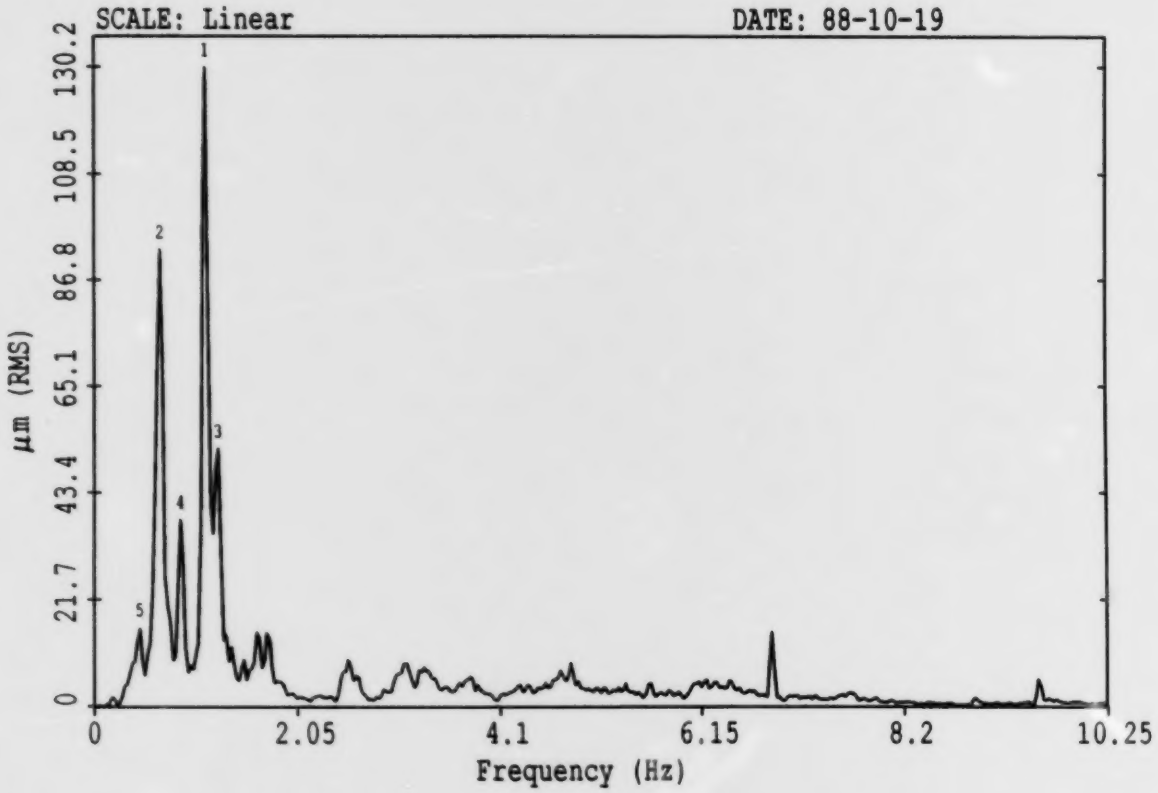


FIGURE A10

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 North-South
PROCESS CONDITION : Main Steam - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	561.50
2	1.128	90.29
3	1.205	67.04
4	0.897	65.02
5	0.410	54.75

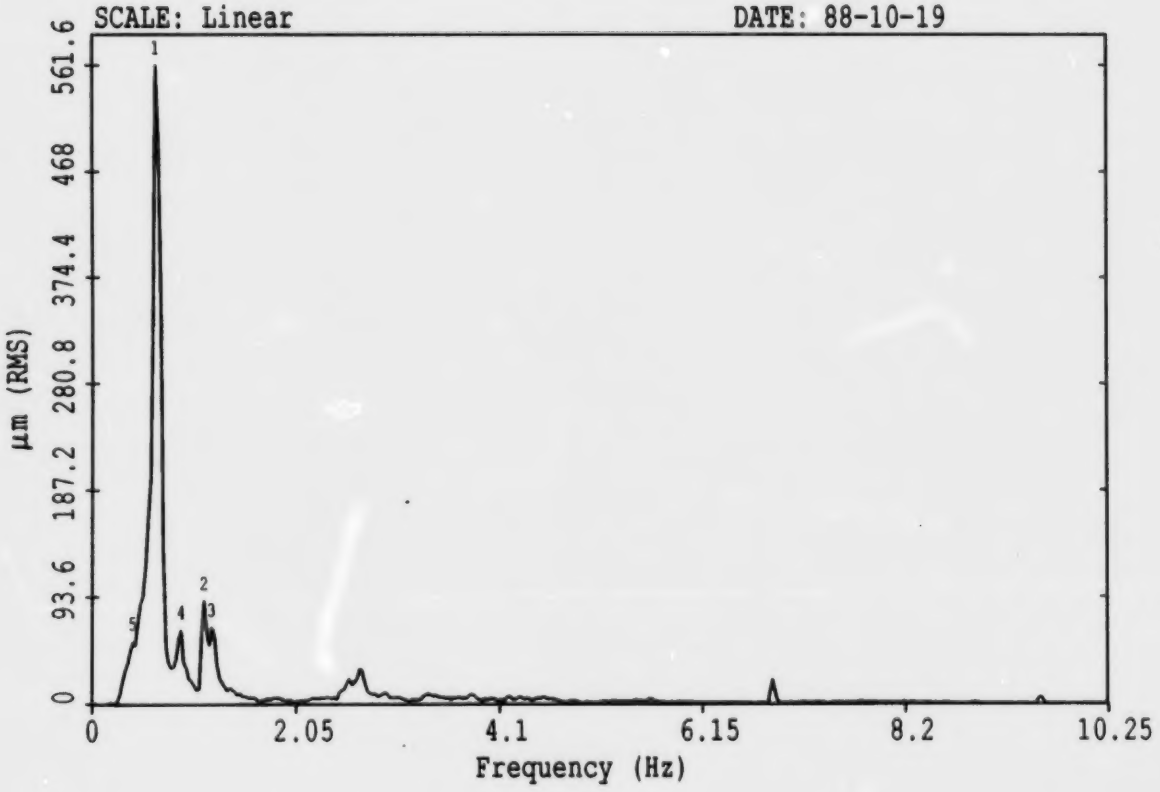


FIGURE A11

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 North-South
PROCESS CONDITION : Main Steam - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	471.80
2	1.205	84.46
3	0.487	80.28
4	1.128	65.51
5	0.872	49.49

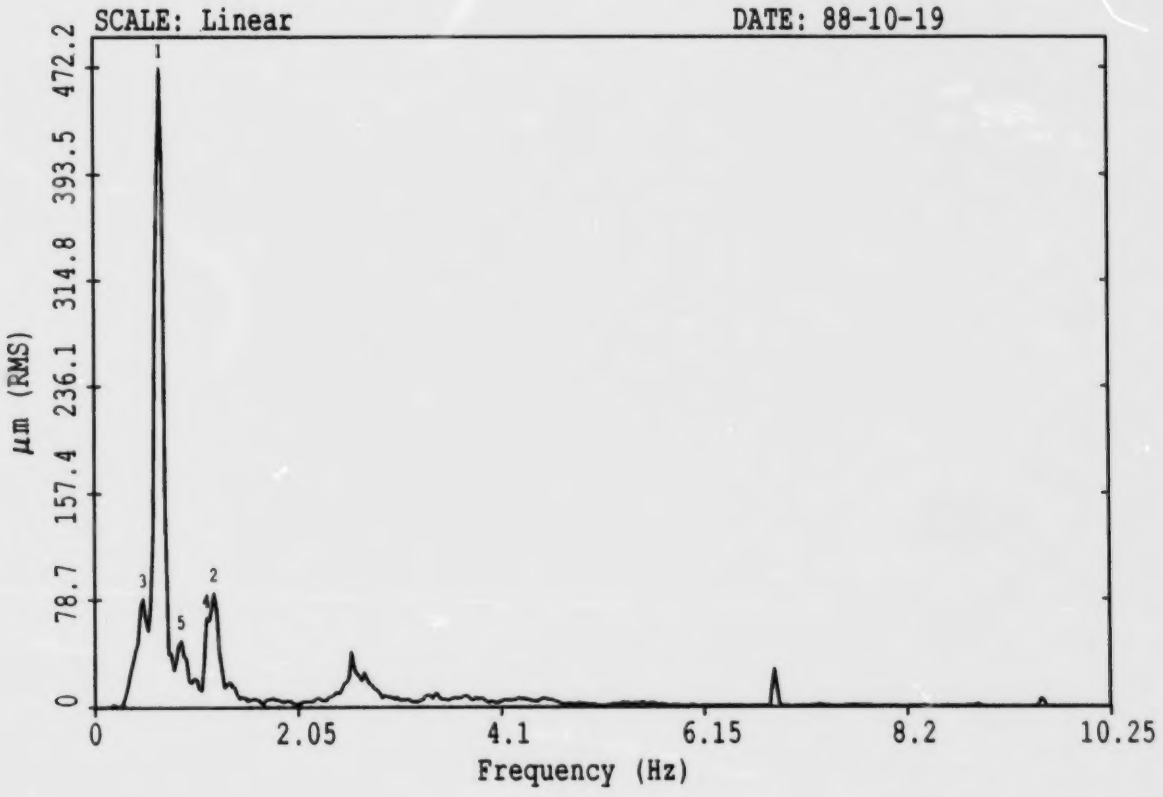


FIGURE A12

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 North-South
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	512.50
2	1.128	145.90
3	0.462	69.17
4	0.795	62.12
5	0.974	54.08

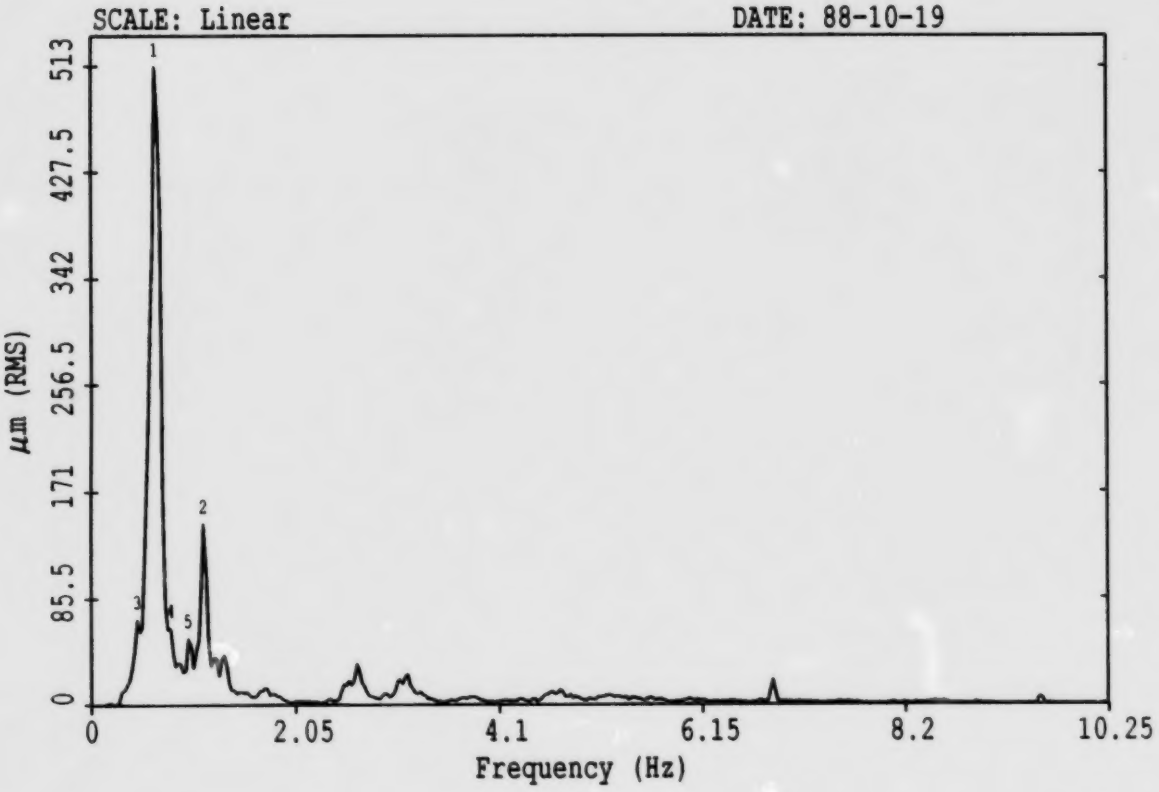


FIGURE A13

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 North-South
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	614.80
2	1.128	368.60
3	0.872	156.00
4	1.308	49.64
5	0.487	47.93

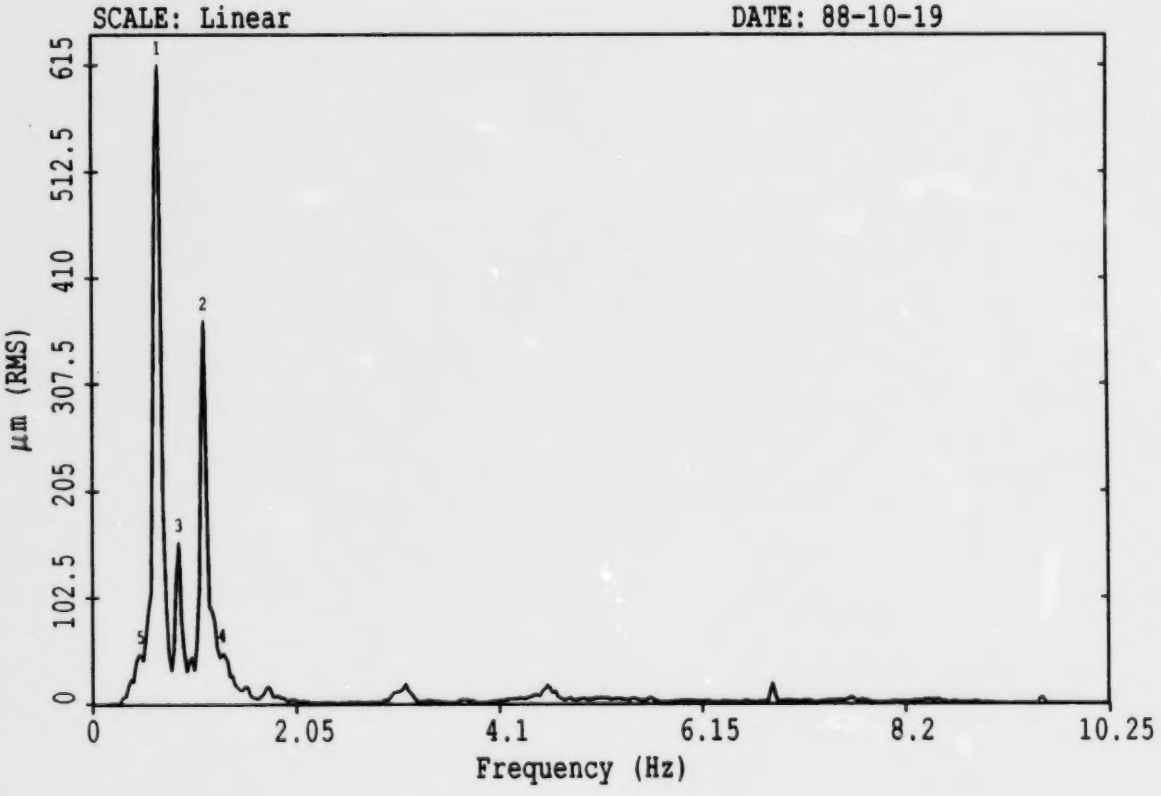


FIGURE A14

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 North-South
PROCESS CONDITION : Main Steam - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	262.20
2	1.128	173.80
3	0.872	155.10
4	1.256	37.73
5	1.744	32.65

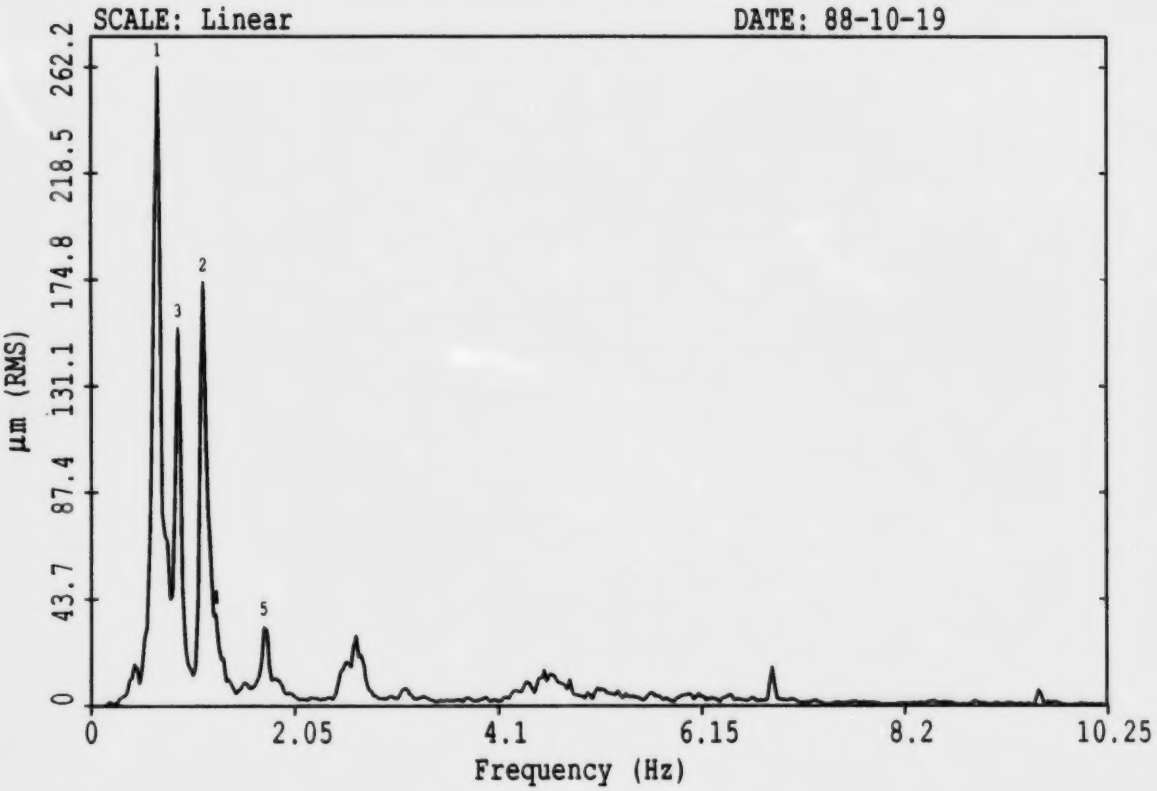


FIGURE A15

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 Vertical
PROCESS CONDITION : Main Steam - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	15.84
2	0.462	13.62
3	3.179	6.18
4	6.820	6.11
5	3.487	5.60

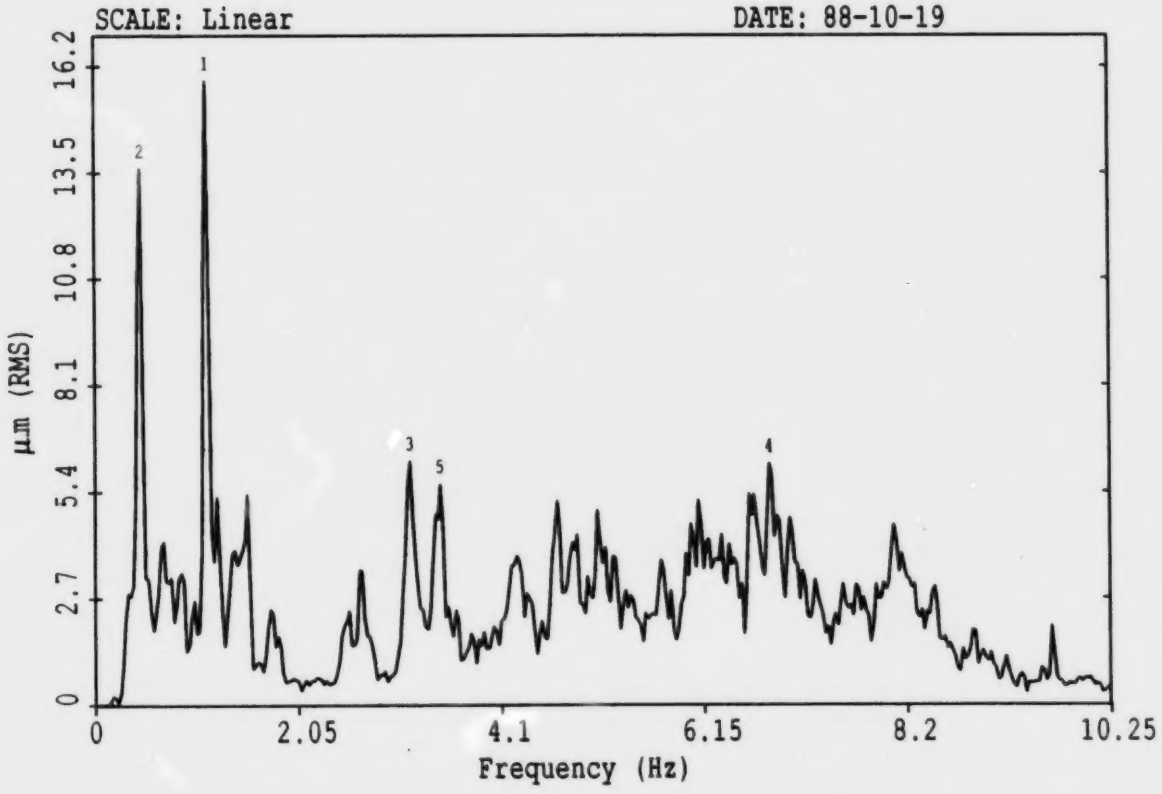


FIGURE A16

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 Vertical
PROCESS CONDITION : Main Steam - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.385	12.42
2	1.128	10.62
3	4.077	5.96
4	1.256	5.84
5	1.205	5.66

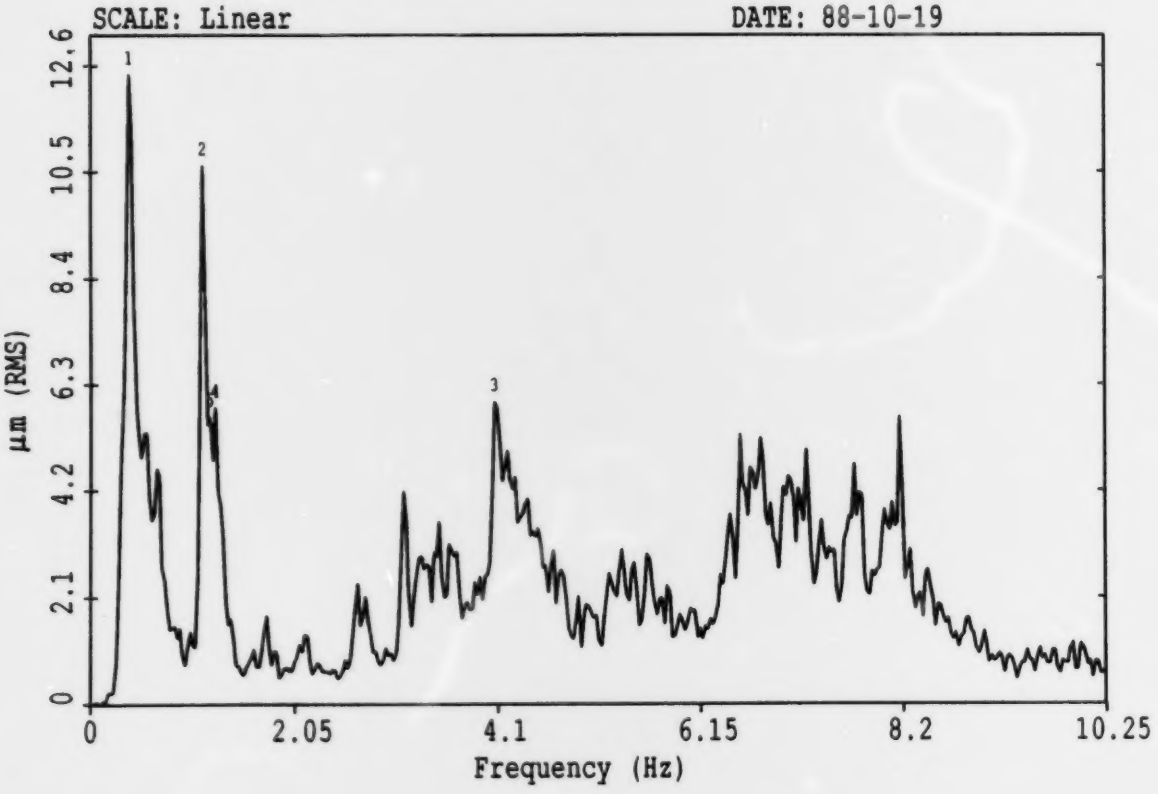


FIGURE A17

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 734 Vertical
PROCESS CONDITION : Main Steam -South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	19.16
2	0.667	14.30
3	0.769	8.98
4	5.256	7.95
5	4.820	7.62

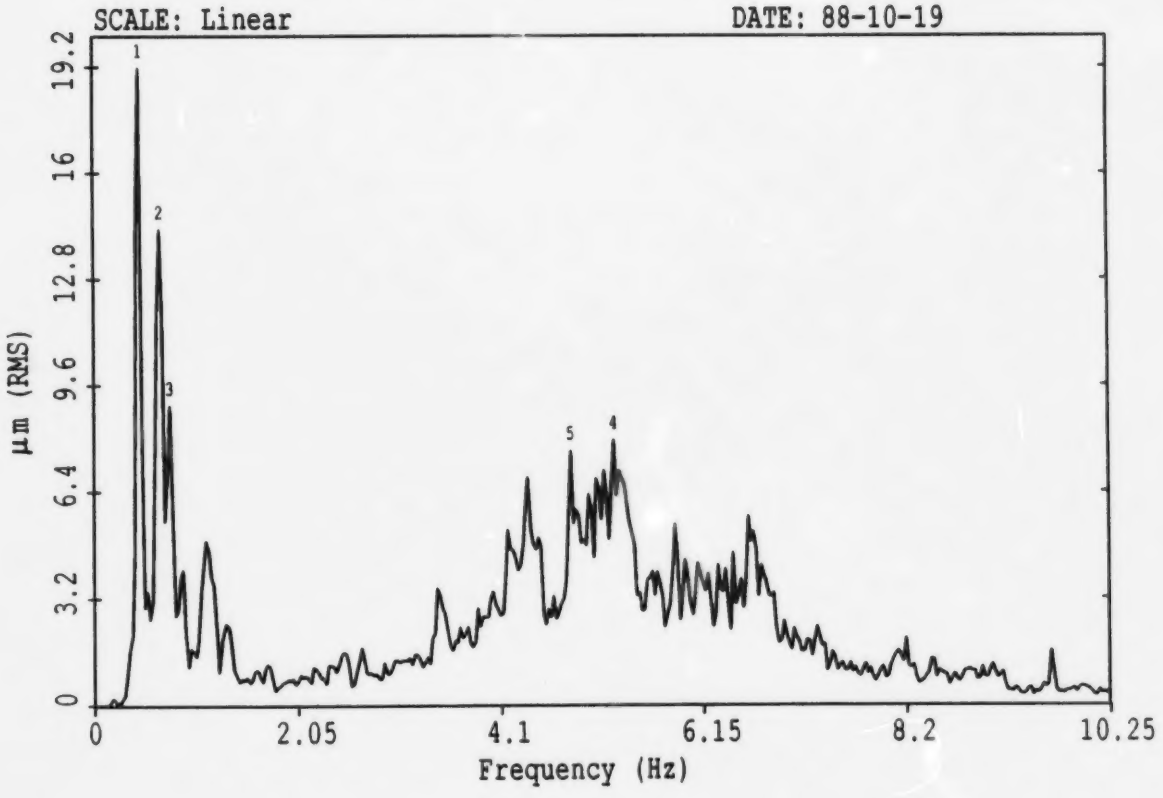


FIGURE A18

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 Vertical
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	21.65
2	1.103	18.26
3	0.436	15.63
4	0.744	11.97
5	1.179	11.75

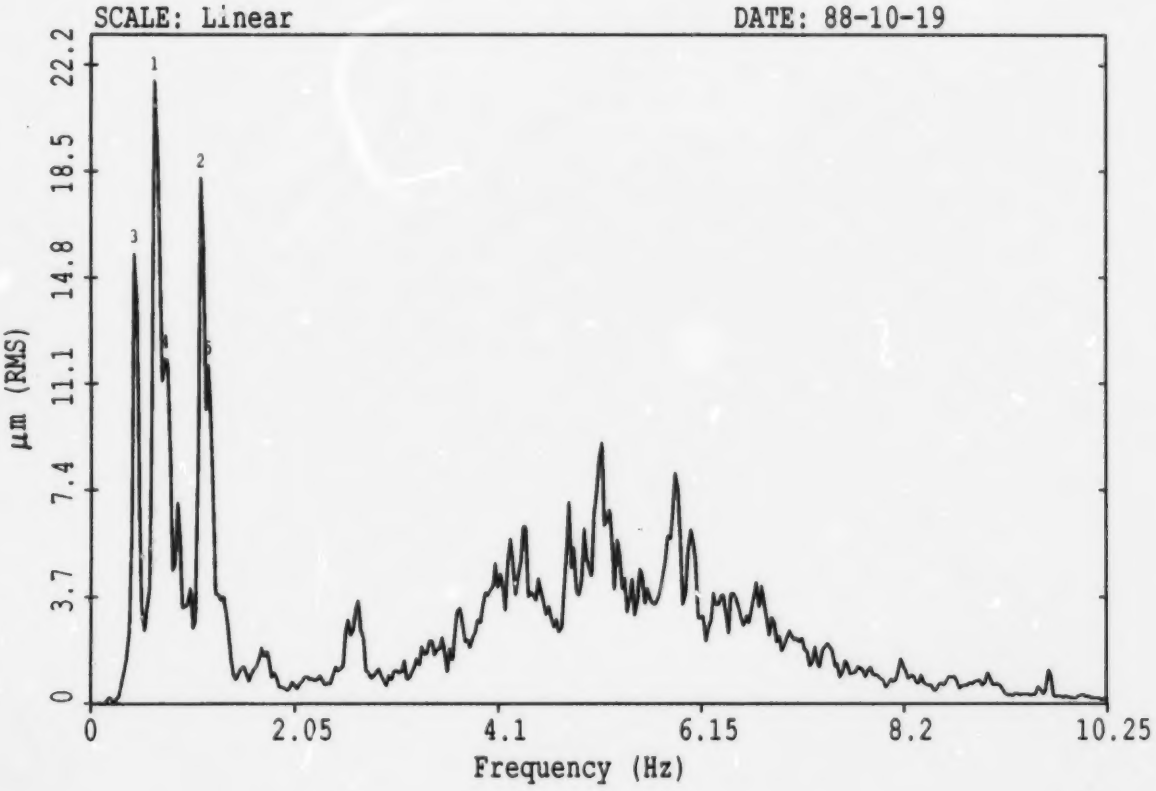


FIGURE A19

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 Vertical
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.744	29.16
2	1.103	28.88
3	0.692	28.12
4	1.333	12.65
5	0.872	12.13

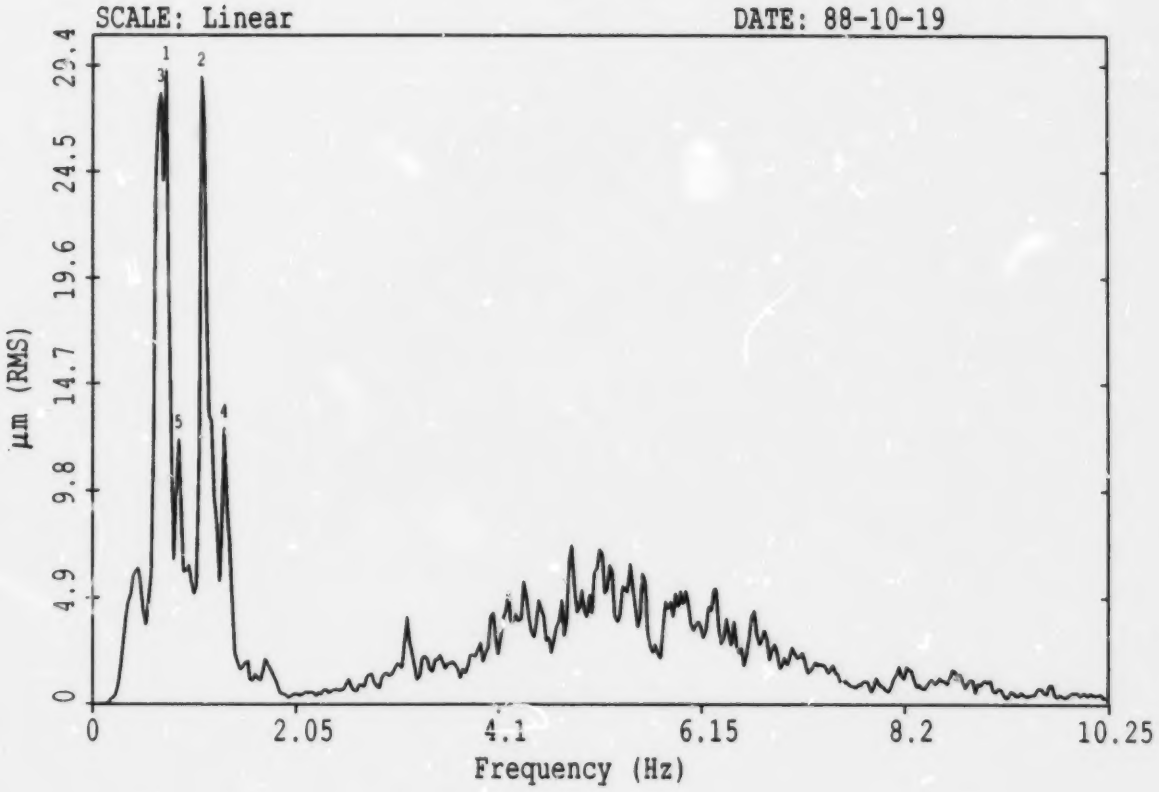


FIGURE A20

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 East-West
PROCESS CONDITION : Main Steam - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	147.30
2	0.769	133.80
3	1.205	117.80
4	1.128	116.30
5	0.872	95.16

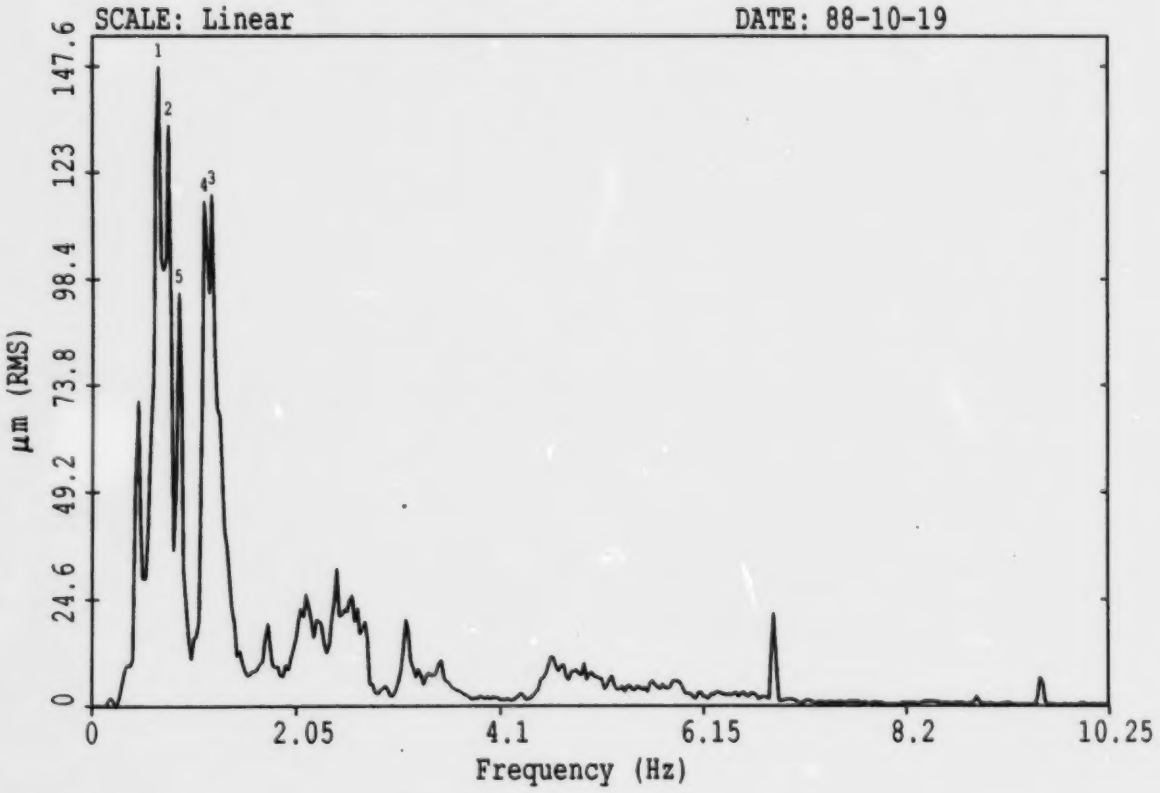


FIGURE A21

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 East-West
PROCESS CONDITION : Main Steam - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	414.30
2	1.128	169.20
3	1.256	78.84
4	0.744	71.47
5	0.692	63.09

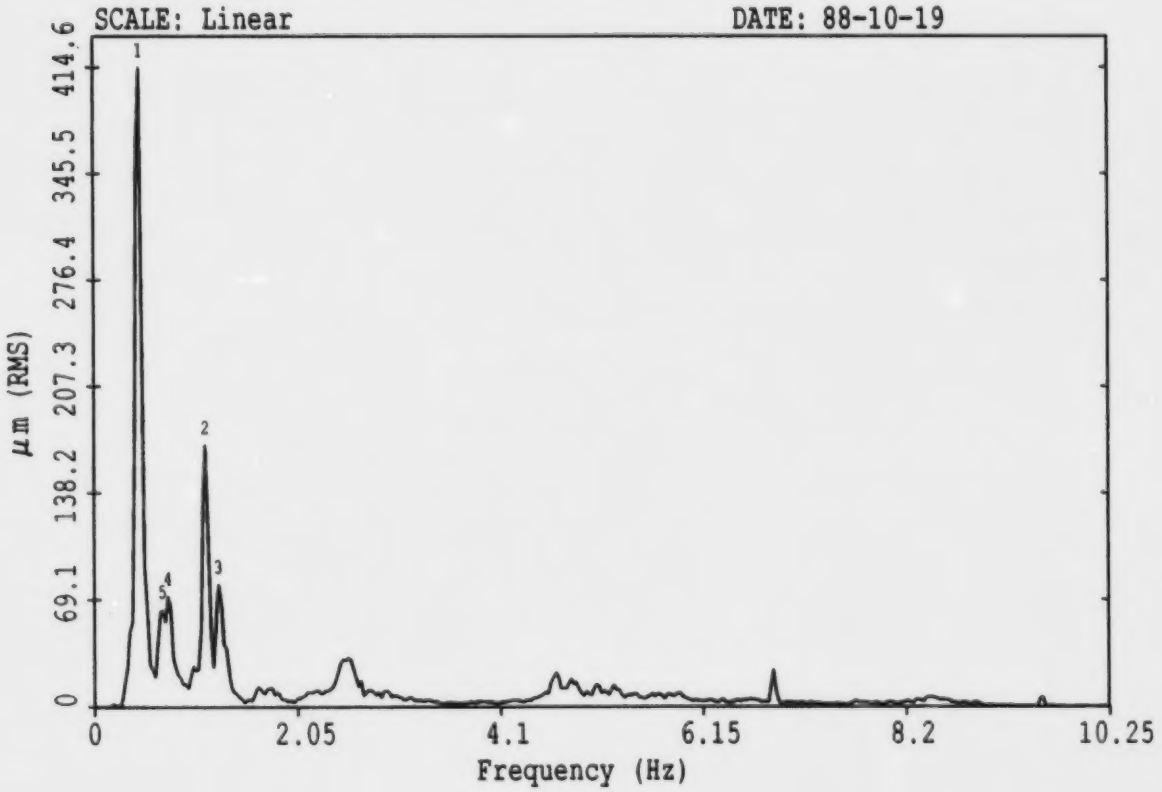


FIGURE A22

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 734 East-West
PROCESS CONDITION : Main Steam -South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	875.90
2	0.667	142.20
3	0.769	87.13
4	1.154	74.19
5	0.872	38.09

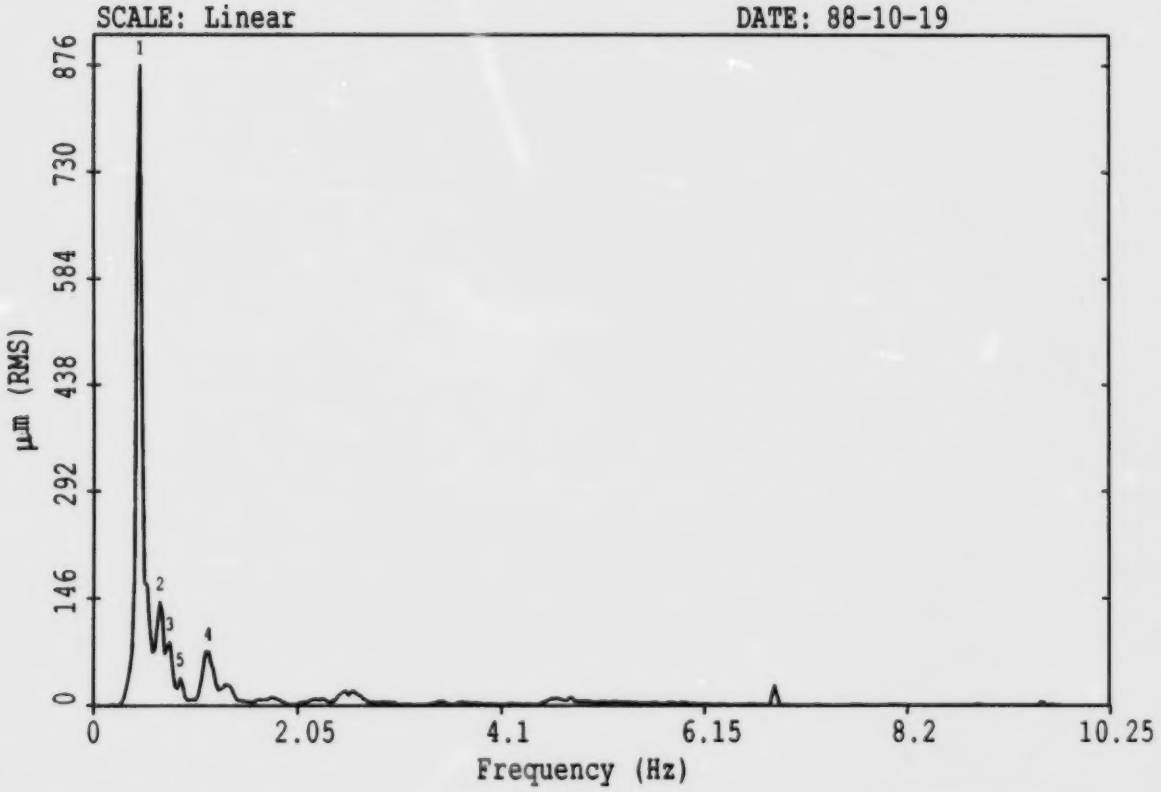


FIGURE A23

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 East-West
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.436	447.10
2	0.692	104.20
3	1.103	79.74
4	0.872	76.74
5	1.256	33.30

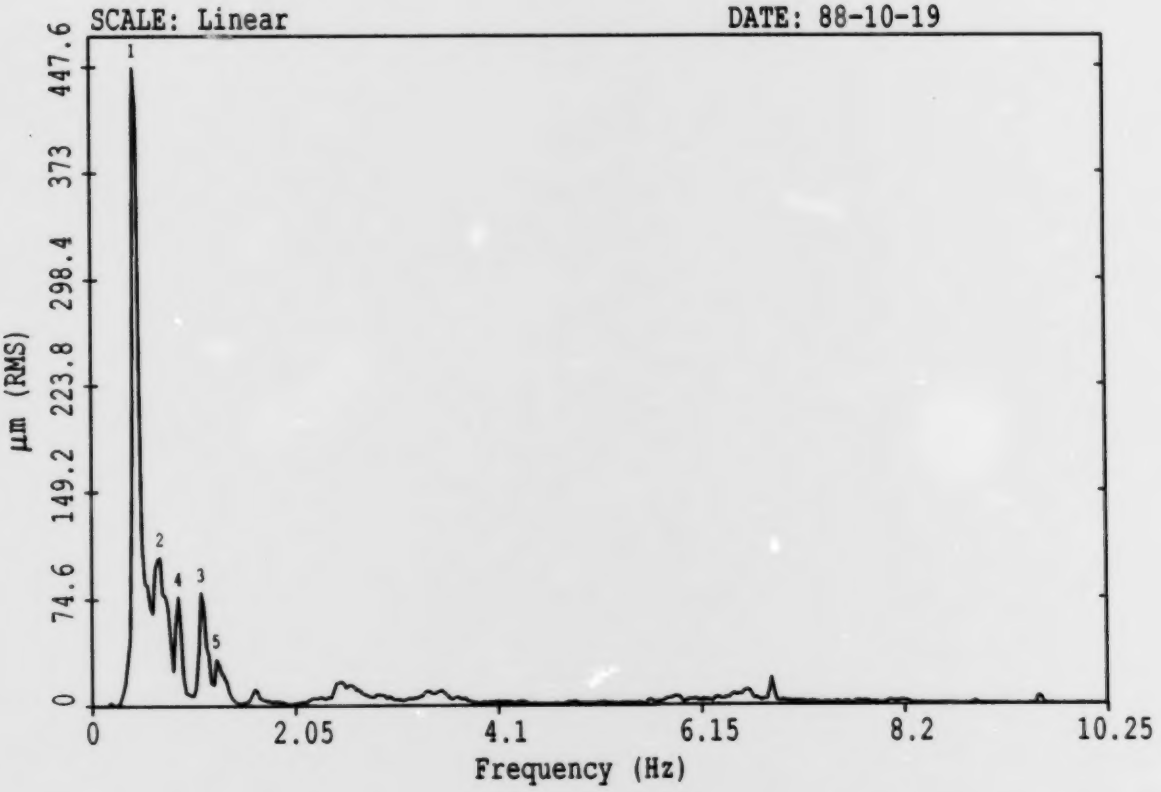


FIGURE A24

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 East-West
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	321.00
2	1.103	171.30
3	0.872	86.96
4	1.256	82.47
5	0.564	56.44

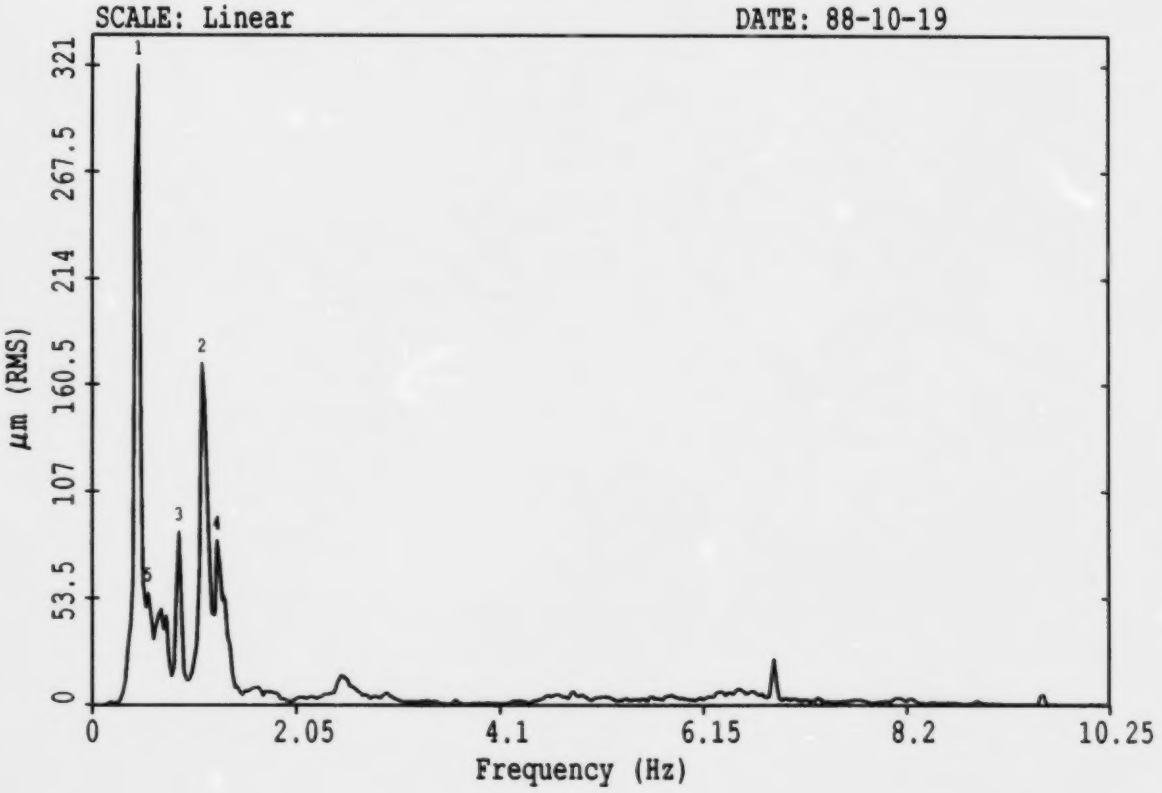


FIGURE A25

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 North-South
PROCESS CONDITION : Main Steam - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	334.10
2	1.128	191.60
3	0.667	[illegible].50
4	0.769	[illegible].20
5	0.872	115.60

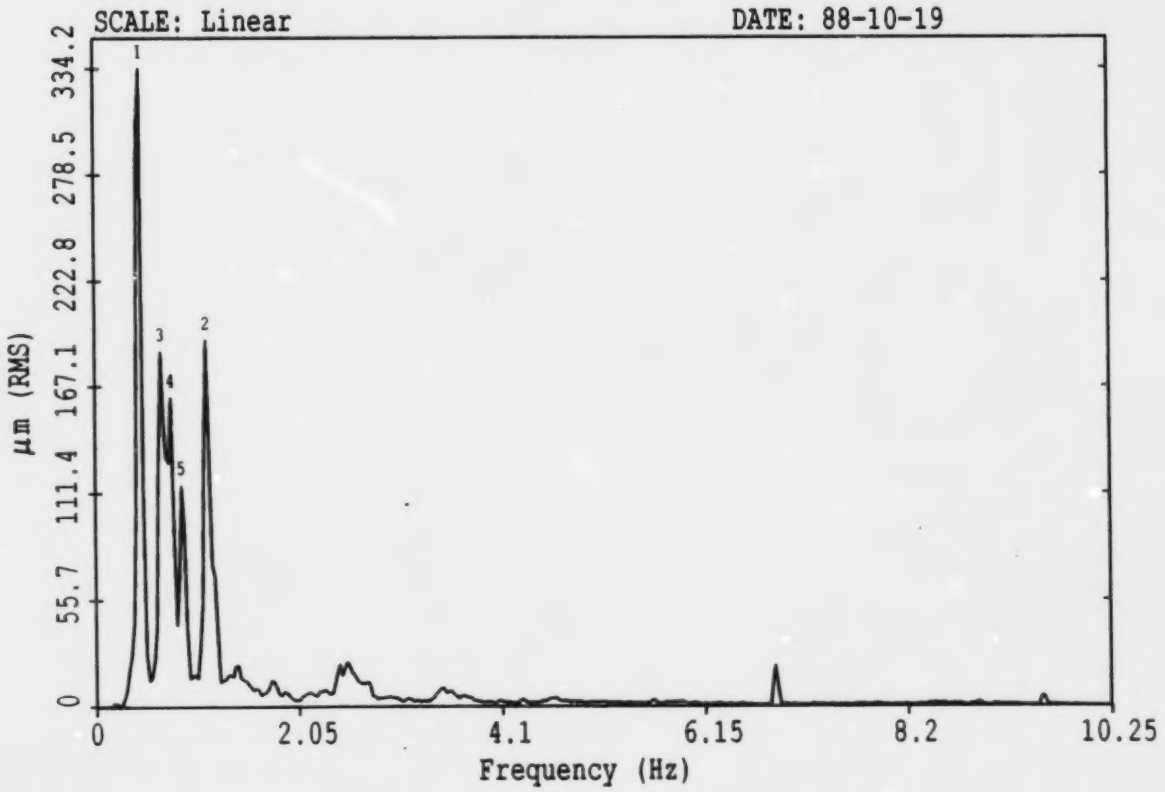


FIGURE A26

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 747 North-South
PROCESS CONDITION : Main Steam - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	182.00
2	0.744	155.50
3	0.436	126.40
4	0.667	110.10
5	0.897	103.20

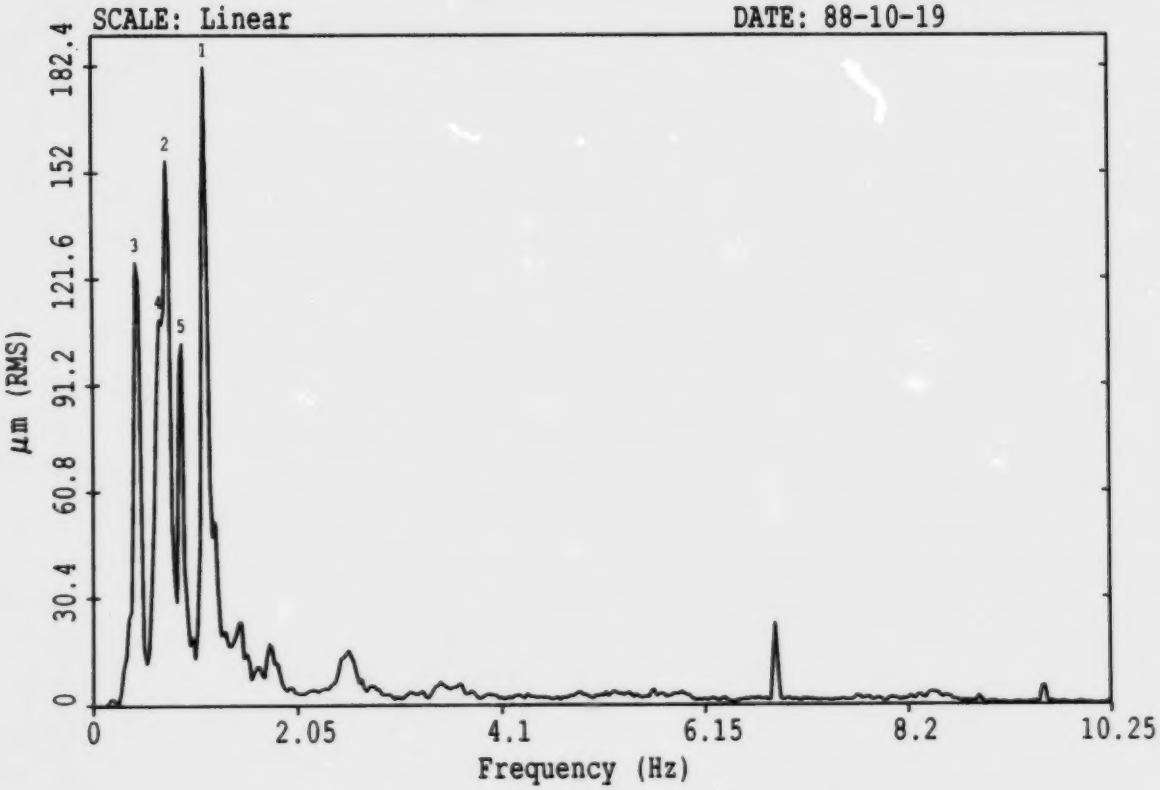


FIGURE A27

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 734 North-South
PROCESS CONDITION : Main Steam -South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.462	297.60
2	0.667	195.10
3	0.769	1.8.00
4	0.872	122.20
5	1.154	86.07

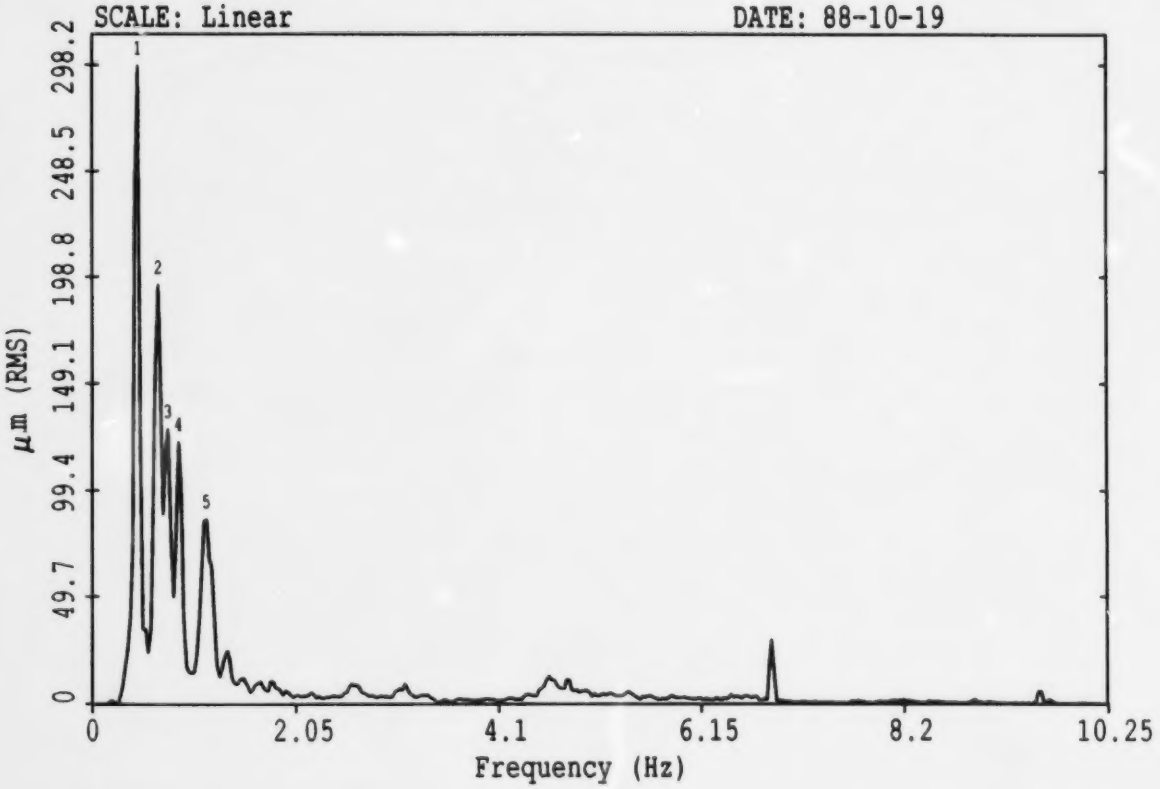


FIGURE A28

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 North-South
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.436	245.30
2	0.641	222.00
3	0.744	145.20
4	0.872	119.60
5	1.103	104.30

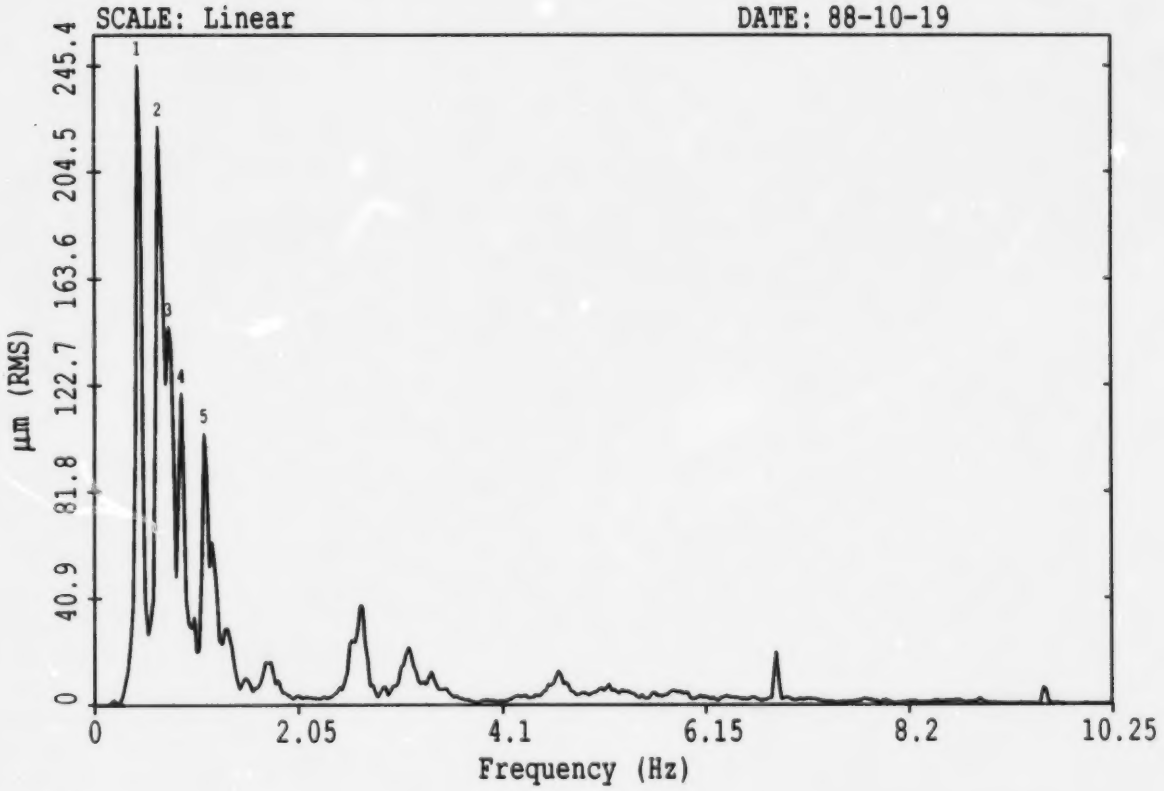


FIGURE A29

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 678 North-South
PROCESS CONDITION : Main Steam - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.103	257.80
2	0.667	225.60
3	0.744	217.80
4	0.462	134.00
5	0.872	90.57

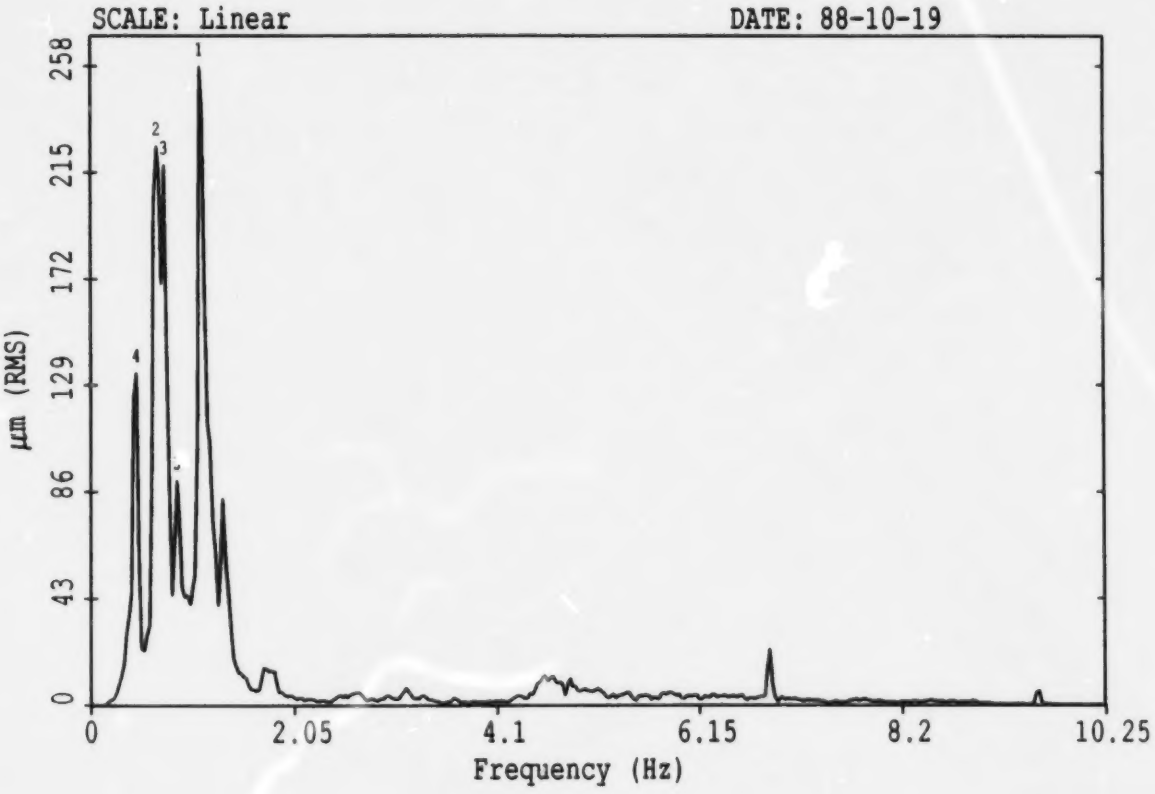


FIGURE A30

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 North-South
PROCESS CONDITION : Main Steam - South Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.667	229.60
2	1.128	126.50
3	0.846	122.20
4	0.333	34.04
5	0.462	32.95

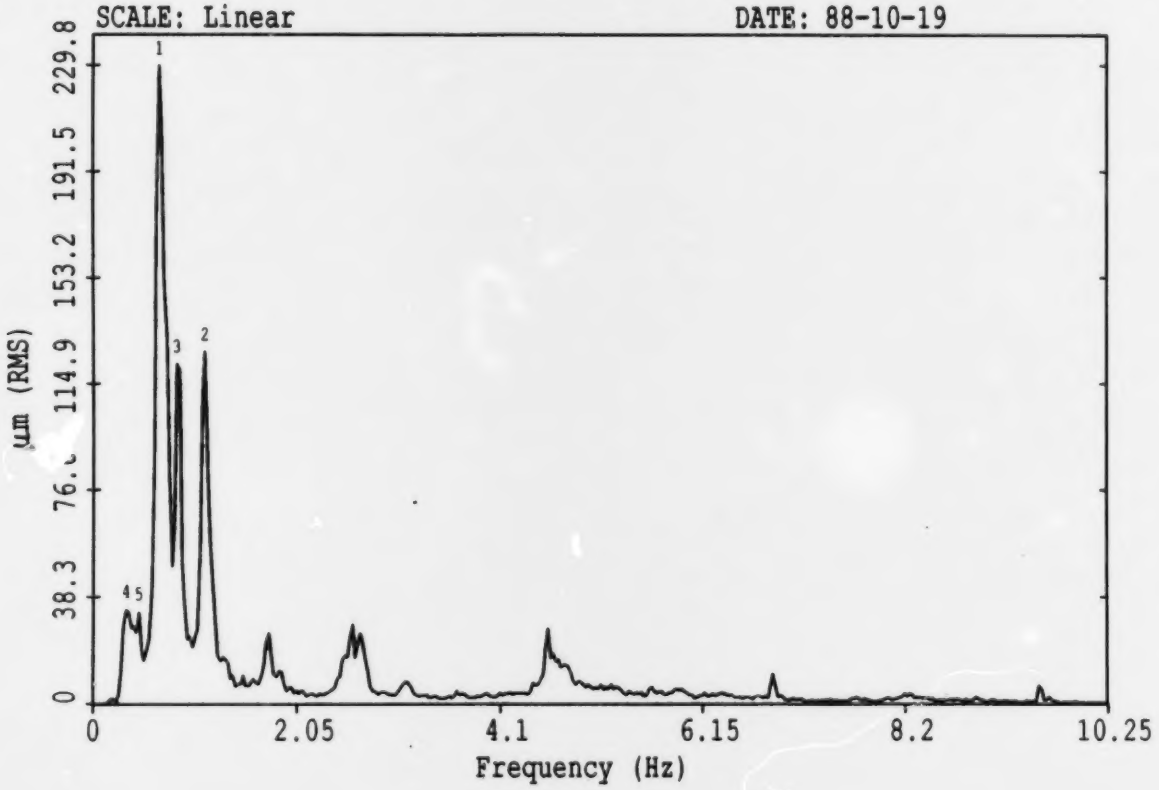


FIGURE A31

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 Vertical
PROCESS CONDITION : Hot Reheat - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	16.16
2	0.333	7.26
3	0.385	7.22
4	7.308	6.77
5	6.872	5.71

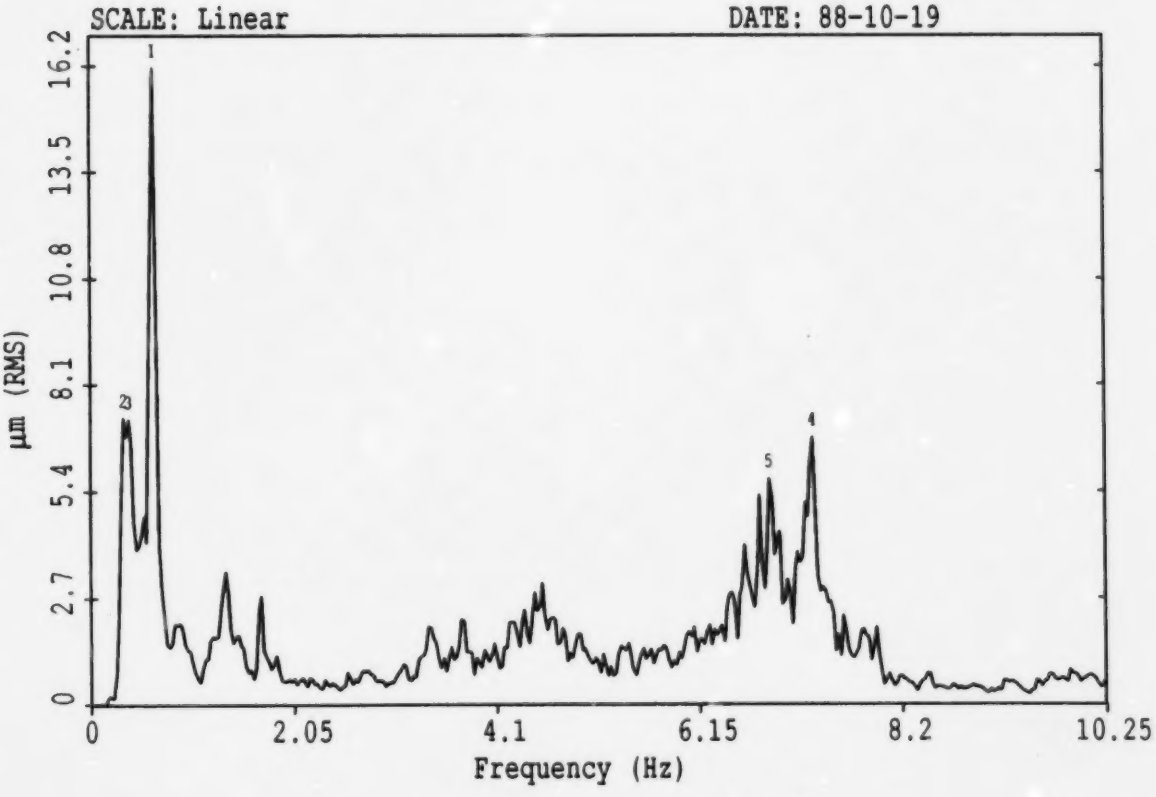


FIGURE A32

Lambton U3 Main Steam & Reheat Lines (500 mw)

SIGNAL : Elev. 675 Vertical
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	73.65
2	6.769	8.95
3	6.923	7.60
4	1.718	6.48
5	1.000	6.15

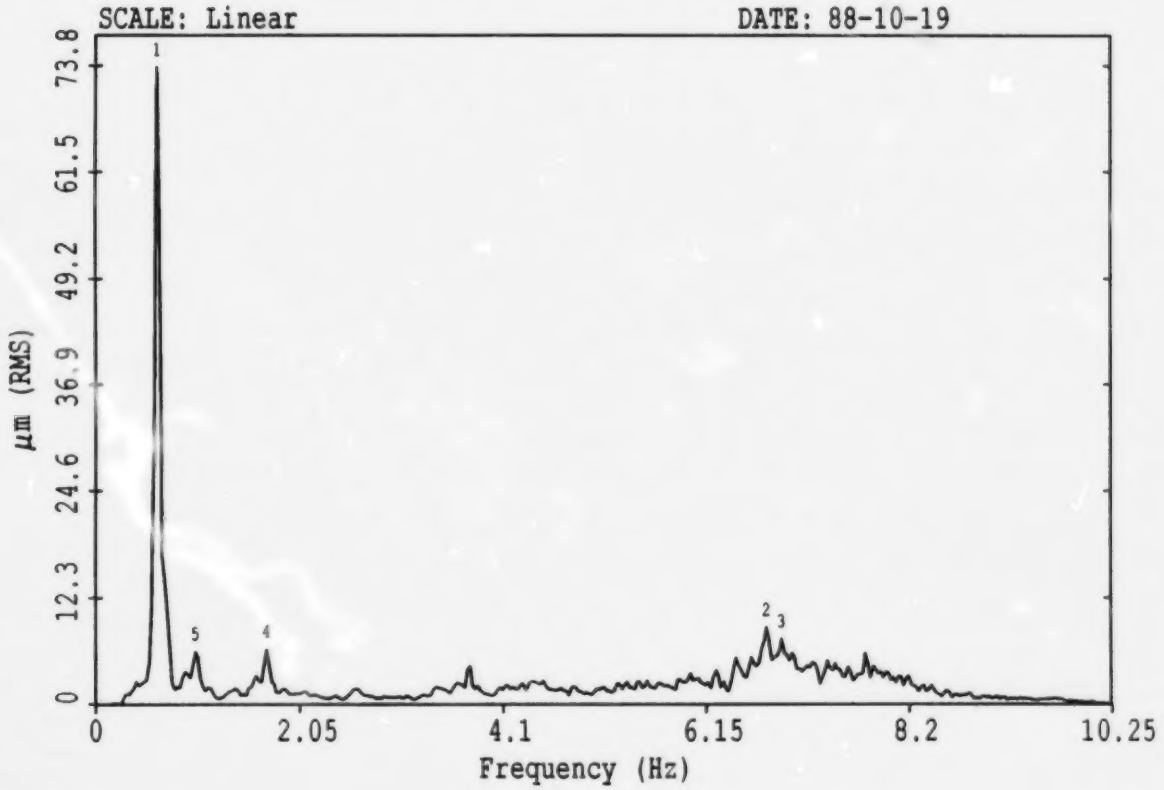


FIGURE A33

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 East-West
PROCESS CONDITION : Hot Reheat - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	245.10
2	0.641	208.10
3	0.692	99.01
4	1.231	83.20
5	1.000	80.60

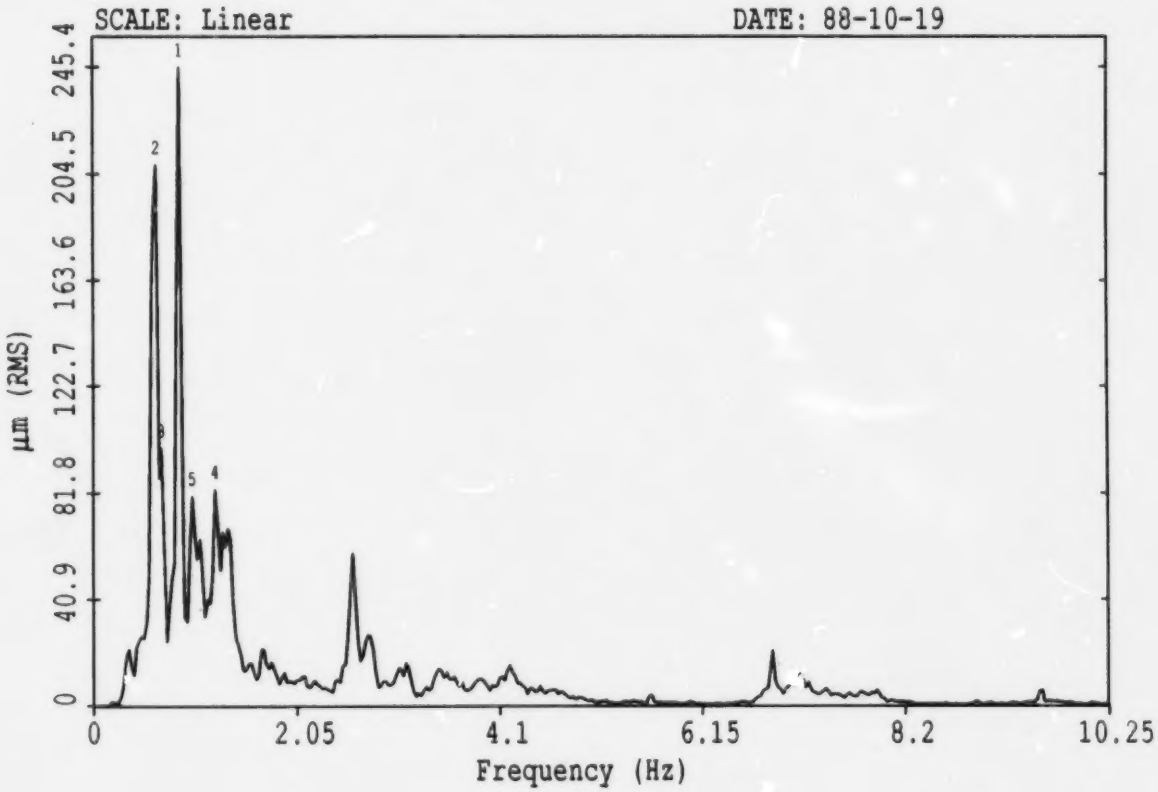


FIGURE A34

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 East-West
PROCESS CONDITION : Hot Reheat - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	351.80
2	0.872	285.80
3	1.359	95.69
4	1.231	84.20
5	1.000	74.53

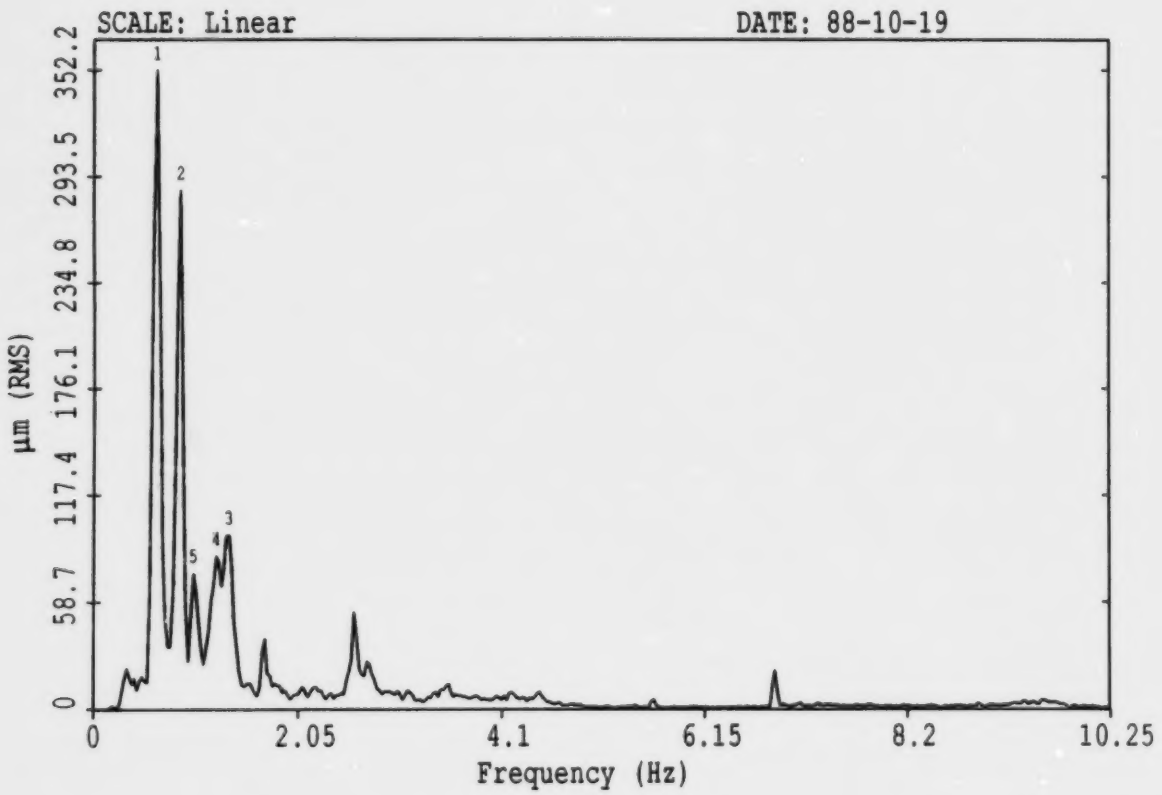


FIGURE A35

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 708 East-West
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	322.20
2	0.692	277.60
3	0.897	53.37
4	6.872	28.20
5	3.487	26.83

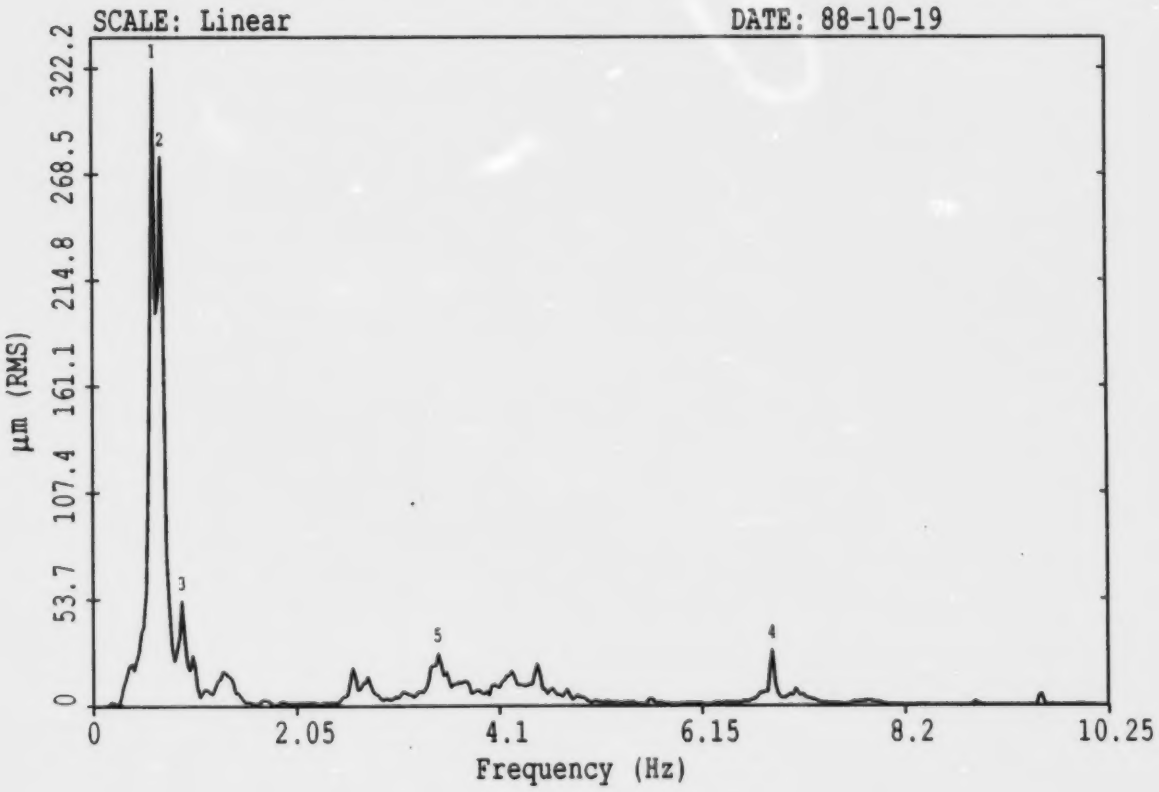


FIGURE A36

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 675 East-West
PROCESS CONDITION : Hot Reheat - North Line **(on hanger)**

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.718	312.60
2	0.615	166.30
3	1.410	80.24
4	0.923	51.29
5	1.333	48.28

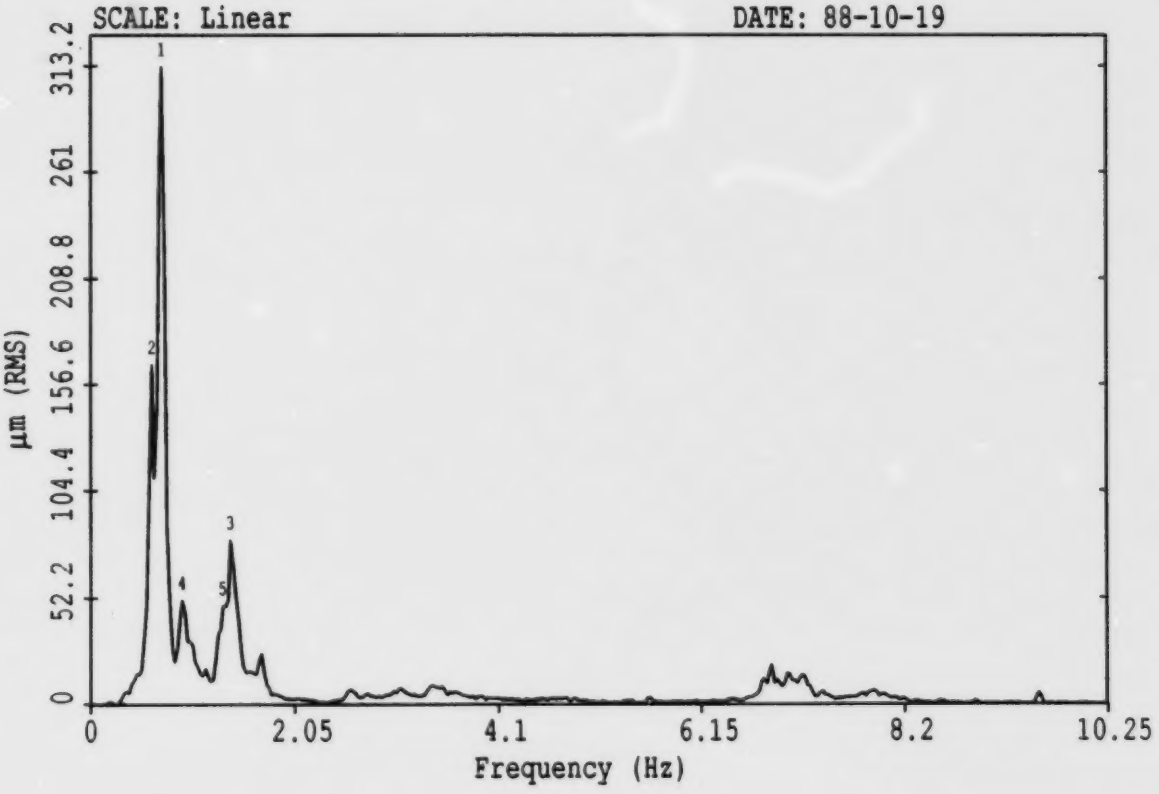


FIGURE A37

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 609 East-West
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	98.79
2	0.564	63.81
3	0.769	34.73
4	0.872	32.82
5	1.359	31.20

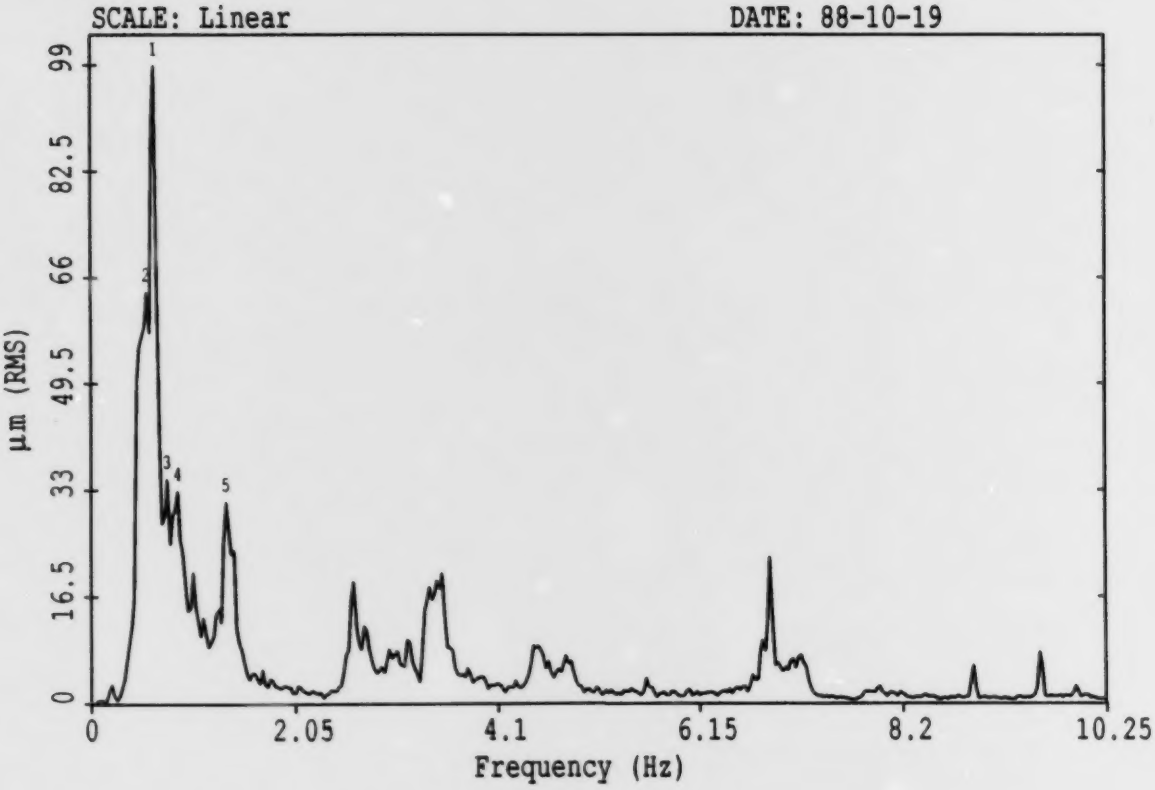


FIGURE A38

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 North-South
PROCESS CONDITION : Hot Reheat - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	76.52
2	0.590	76.46
3	0.436	39.53
4	0.692	34.95
5	1.000	25.63

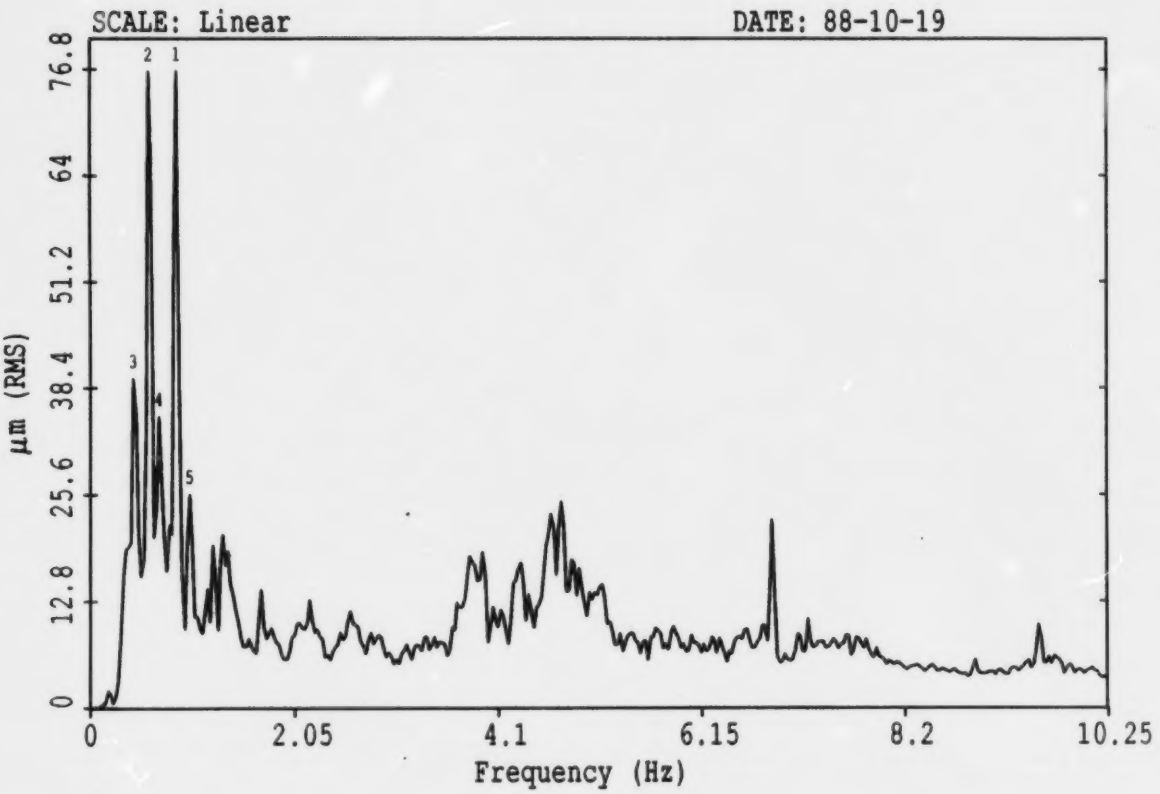


FIGURE A39

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 North-South
PROCESS CONDITION : Hot Reheat - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	511.90
2	0.872	274.60
3	1.000	73.68
4	1.718	47.71
5	0.462	35.48

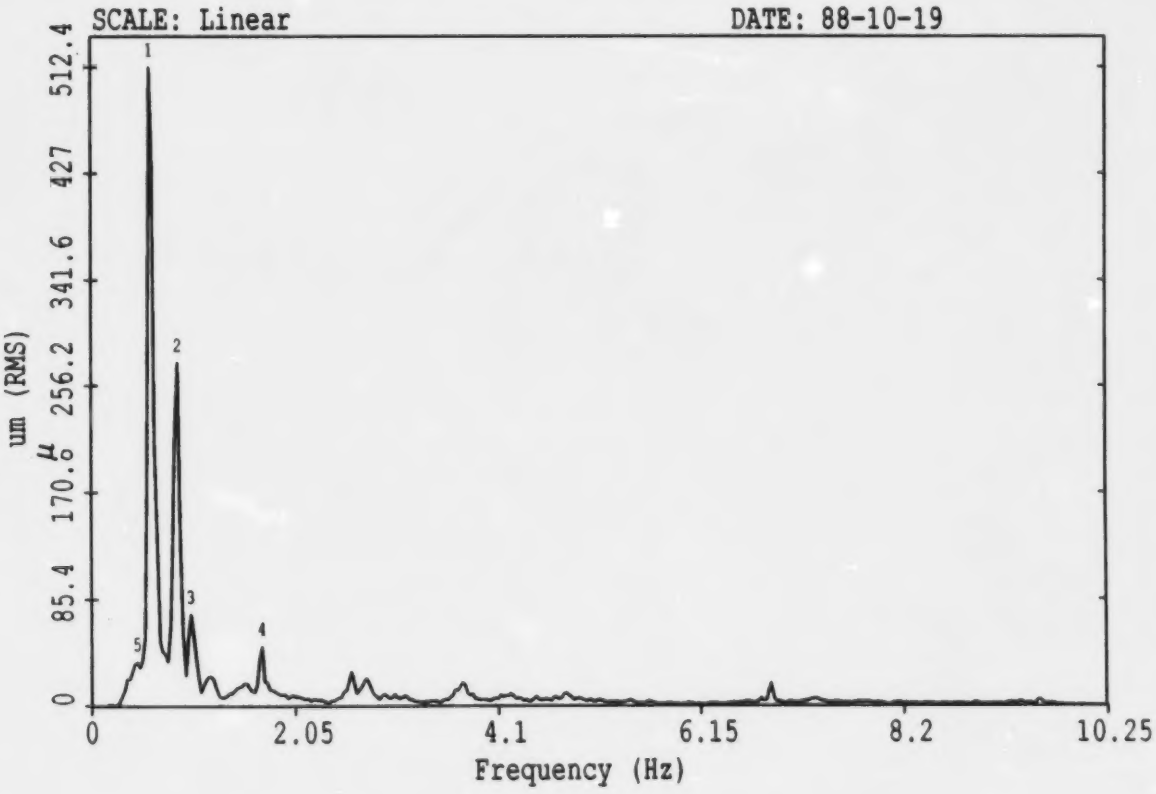


FIGURE A40

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 708 North-South
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	681.30
2	0.692	167.50
3	0.897	130.30
4	0.385	54.99
5	0.333	45.55

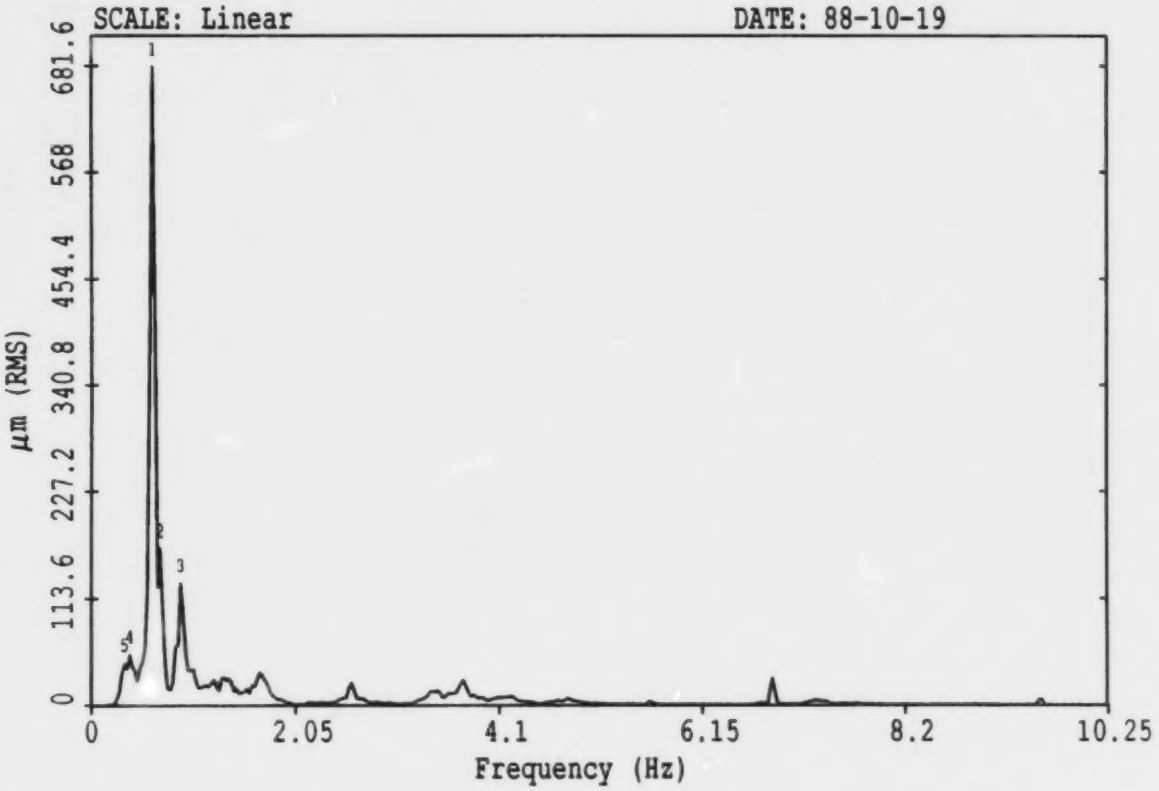


FIGURE A41

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 675 North-South
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	702.10
2	1.718	92.80
3	0.949	40.28
4	1.000	38.32
5	1.615	34.16

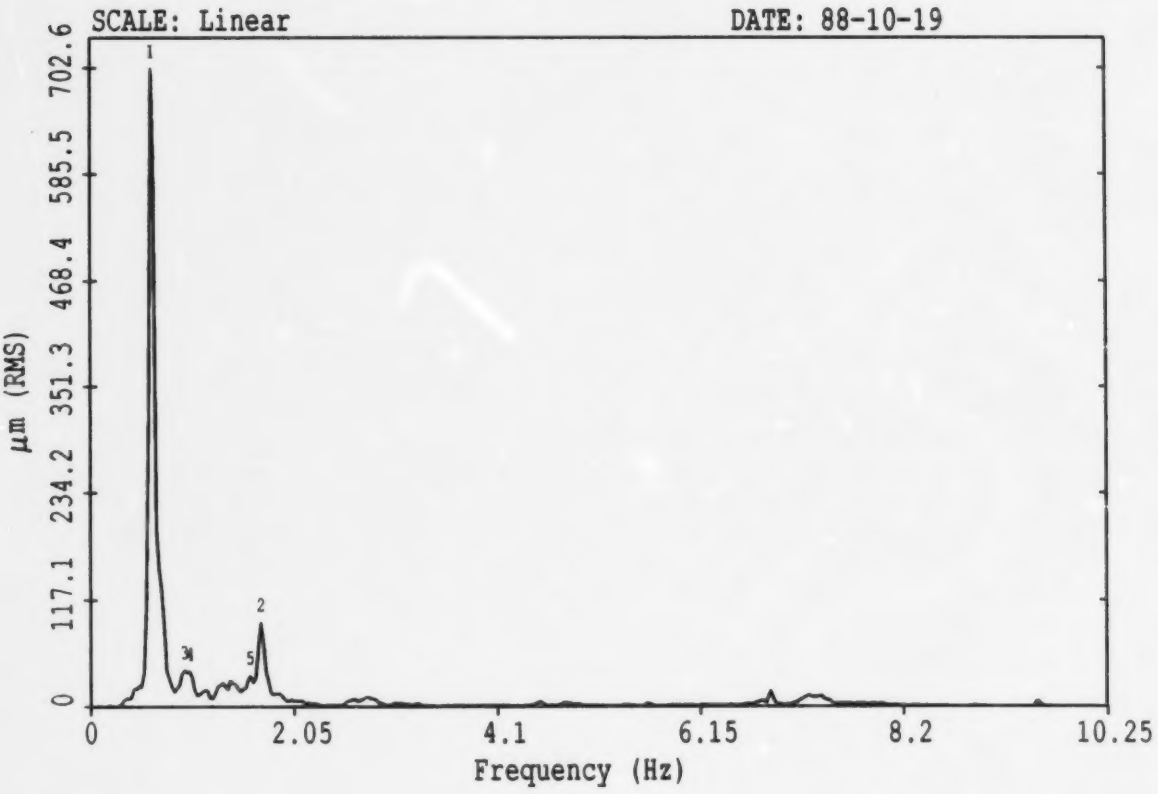


FIGURE A42

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 609 North-South
PROCESS CONDITION : Hot Reheat - North Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	543.90
2	0.872	176.50
3	1.000	97.03
4	1.718	74.66
5	0.385	70.65

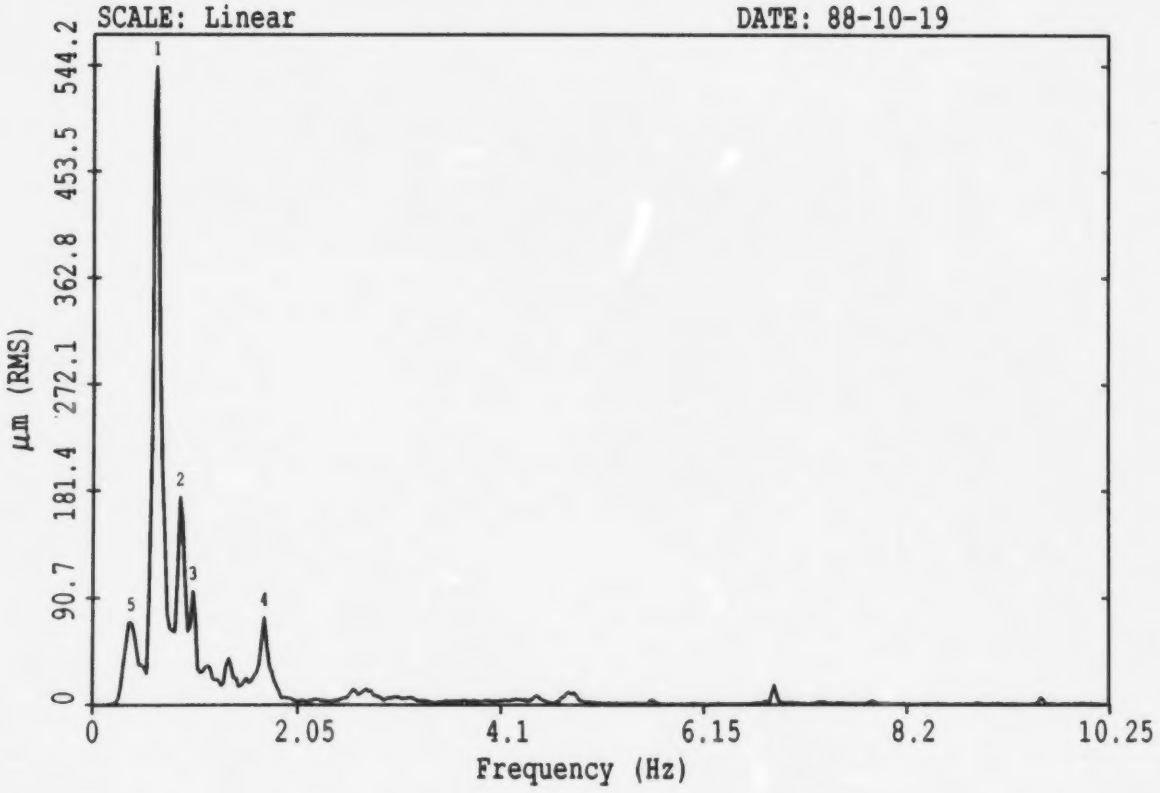


FIGURE A43

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 Vertical
PROCESS CONDITION : Hot Reheat - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	21.39
2	7.179	8.81
3	7.026	8.01
4	6.846	7.48
5	7.641	6.83

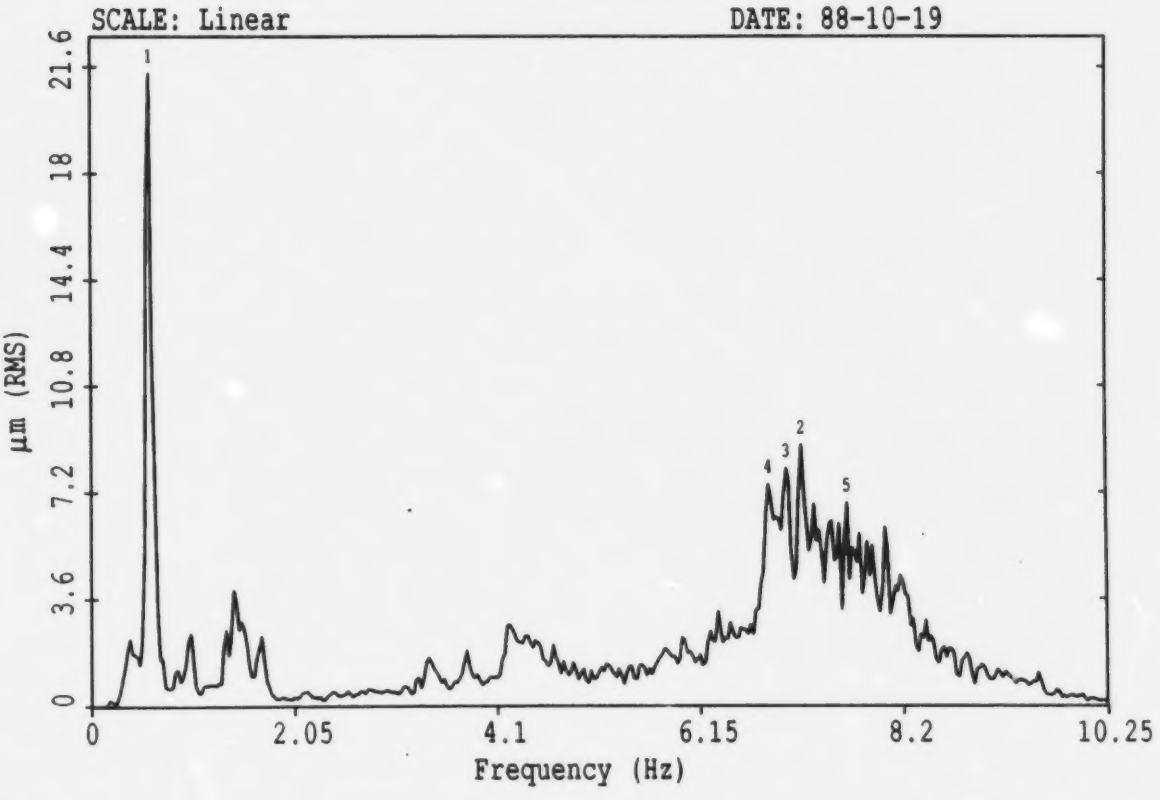


FIGURE A44

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 East-West
PROCESS CONDITION : Hot Reheat - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.564	172.40
2	1.000	67.87
3	0.692	55.65
4	1.205	53.85
5	1.436	47.28

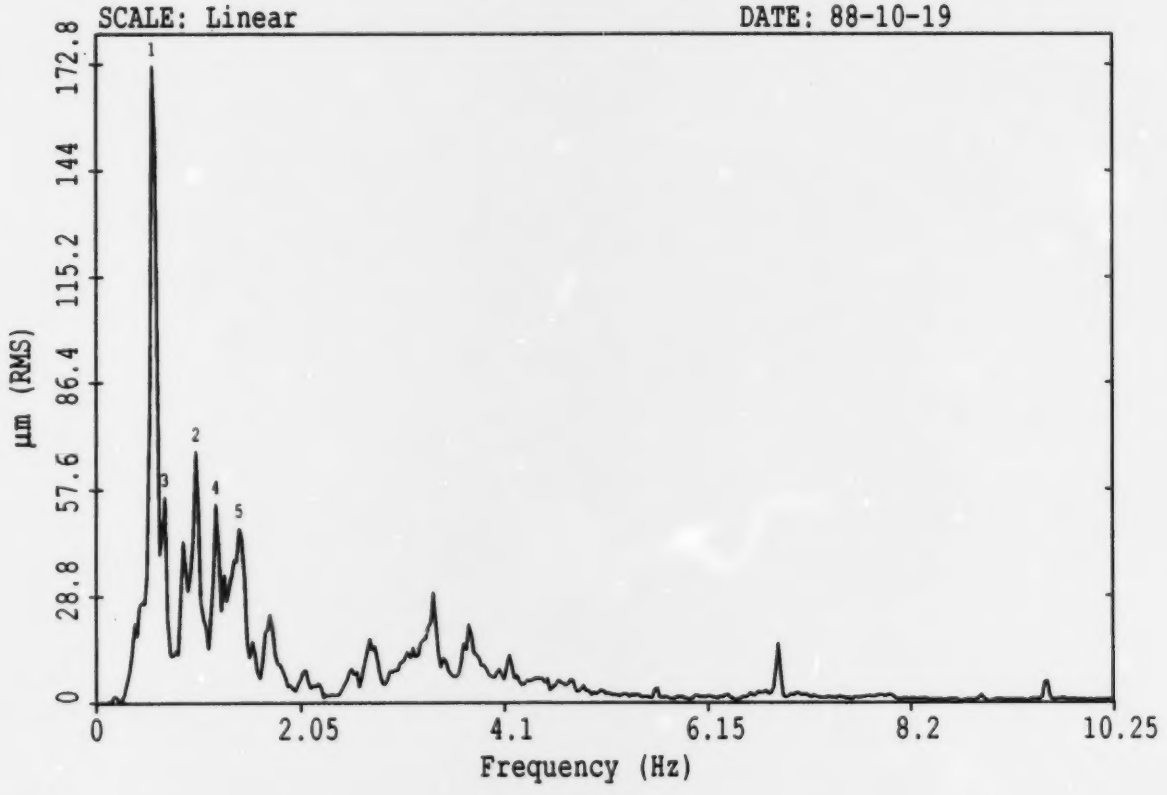


FIGURE A45

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 734 East-West
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	1097.00
2	1.462	49.50
3	1.000	49.21
4	0.923	38.40
5	6.872	31.76

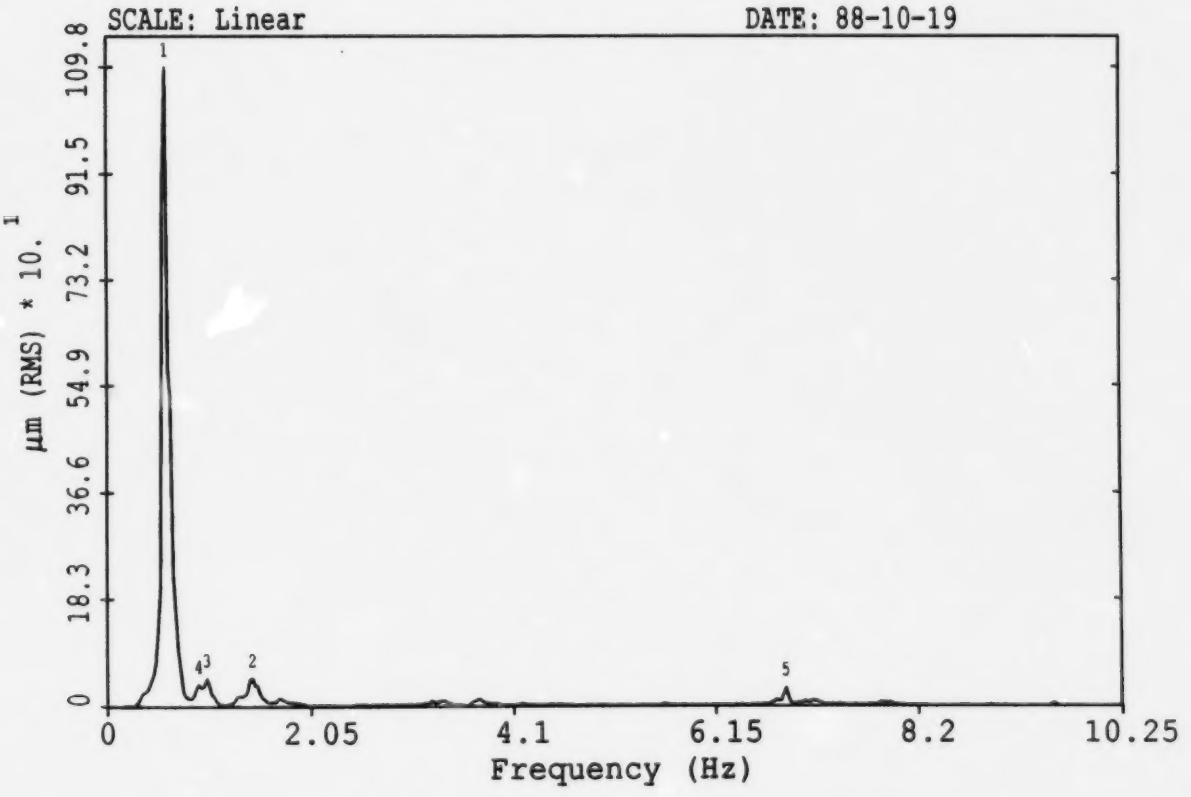


FIGURE A46

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 708 East-West
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	836.30
2	1.000	107.70
3	0.897	44.89
4	0.385	38.36
5	0.821	22.83

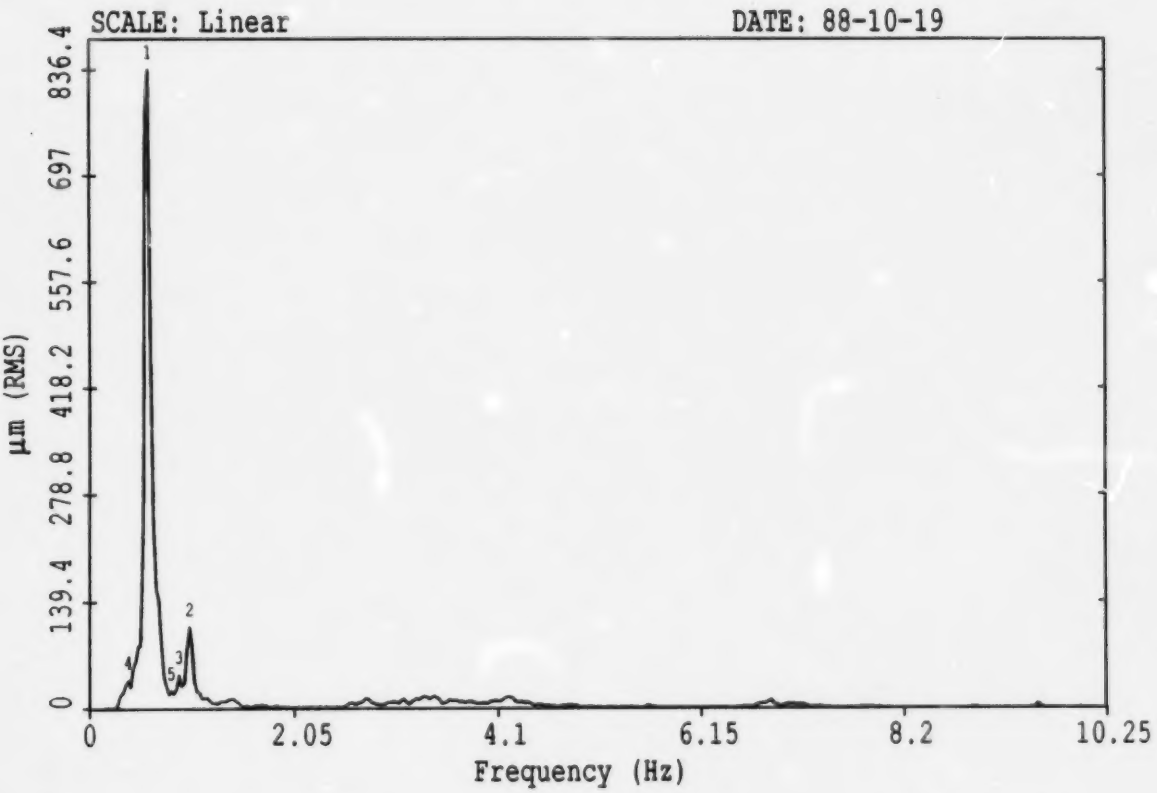


FIGURE A47

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 675 East-West
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	553.00
2	1.000	125.40
3	0.718	98.51
4	0.897	52.29
5	1.436	50.62

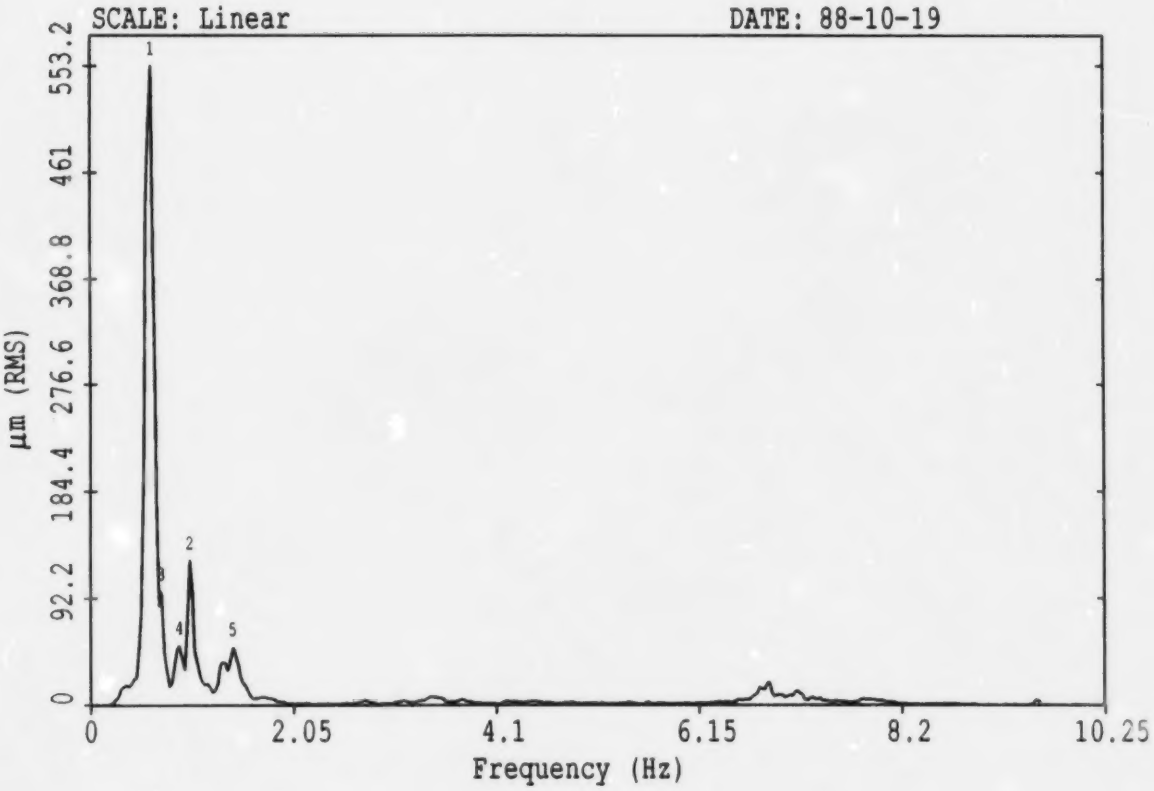


FIGURE A48

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 East-West
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	194.80
2	1.462	59.33
3	0.692	55.66
4	1.333	29.68
5	1.000	29.34

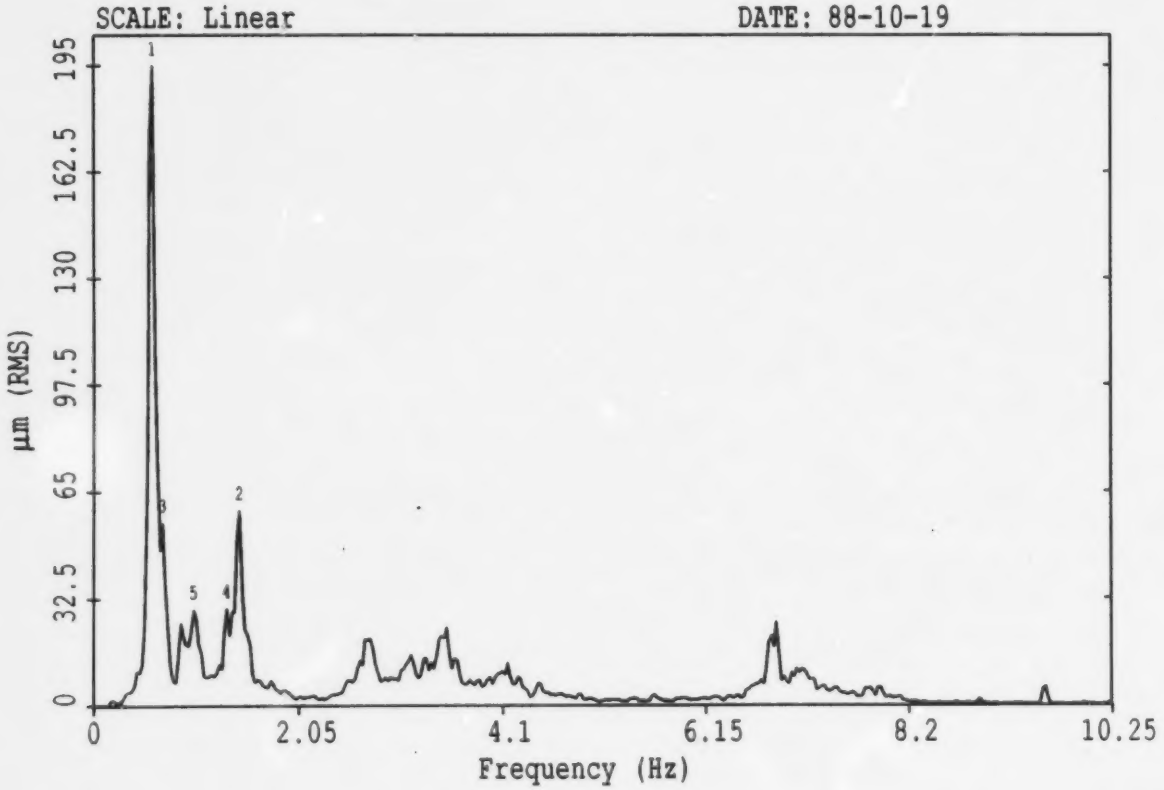


FIGURE A49

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 756 North-South
PROCESS CONDITION : Hot Reheat - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	498.00
2	1.000	196.50
3	0.872	93.89
4	1.205	55.75
5	0.436	49.63

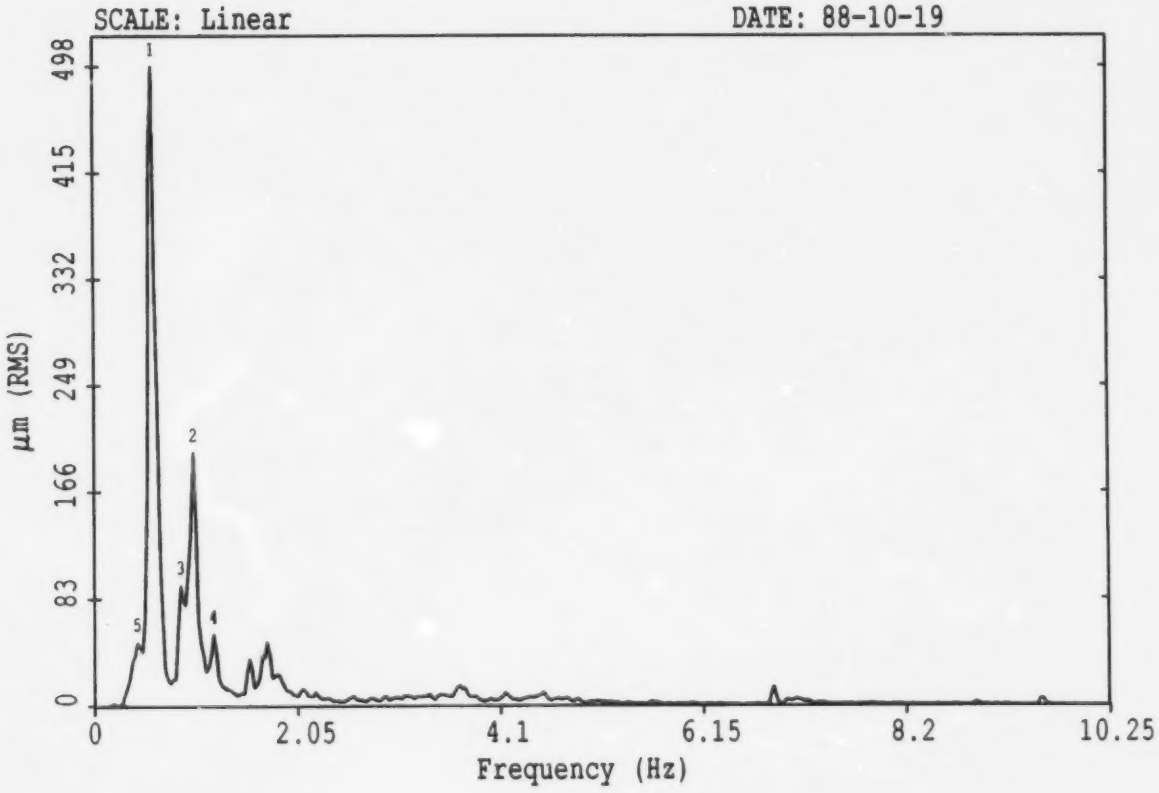


FIGURE A50

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 734 North-South
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	622.60
2	1.000	171.10
3	0.692	159.80
4	0.923	89.49
5	1.179	43.09

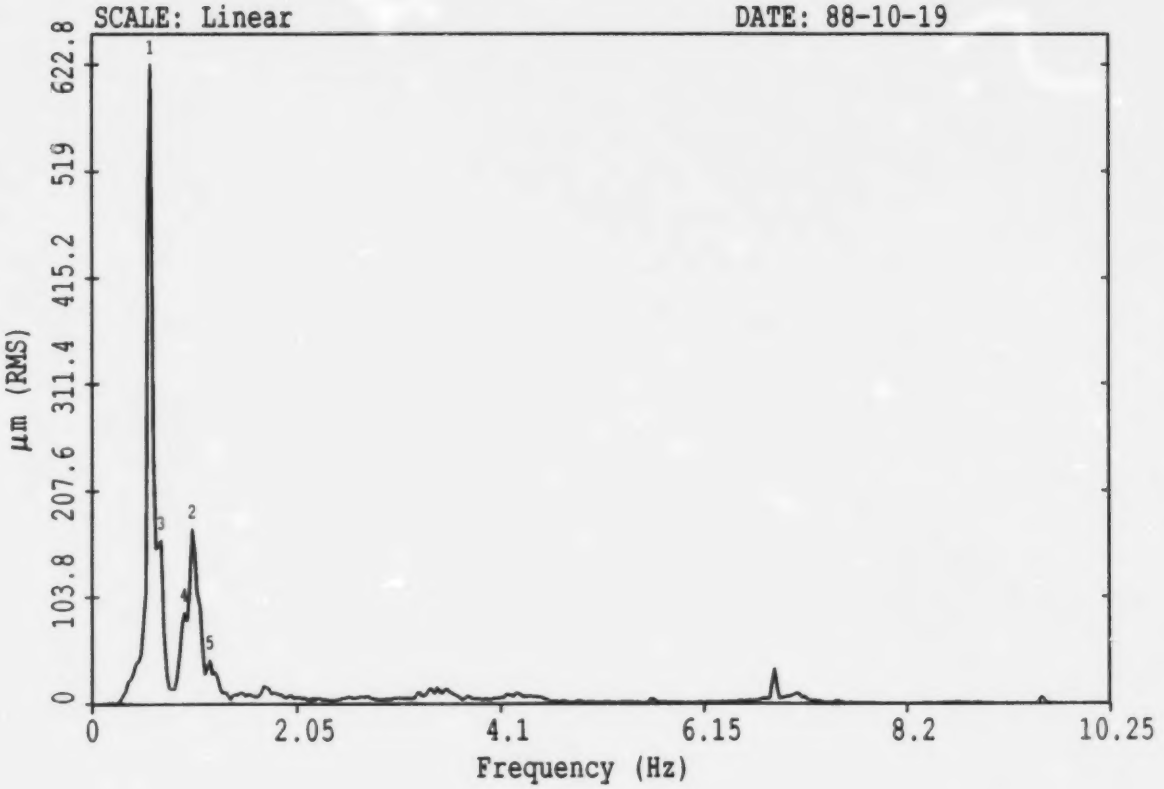


FIGURE A51

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 708 North-South
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	481.40
2	0.692	221.70
3	1.000	138.90
4	1.103	65.21
5	1.718	61.02

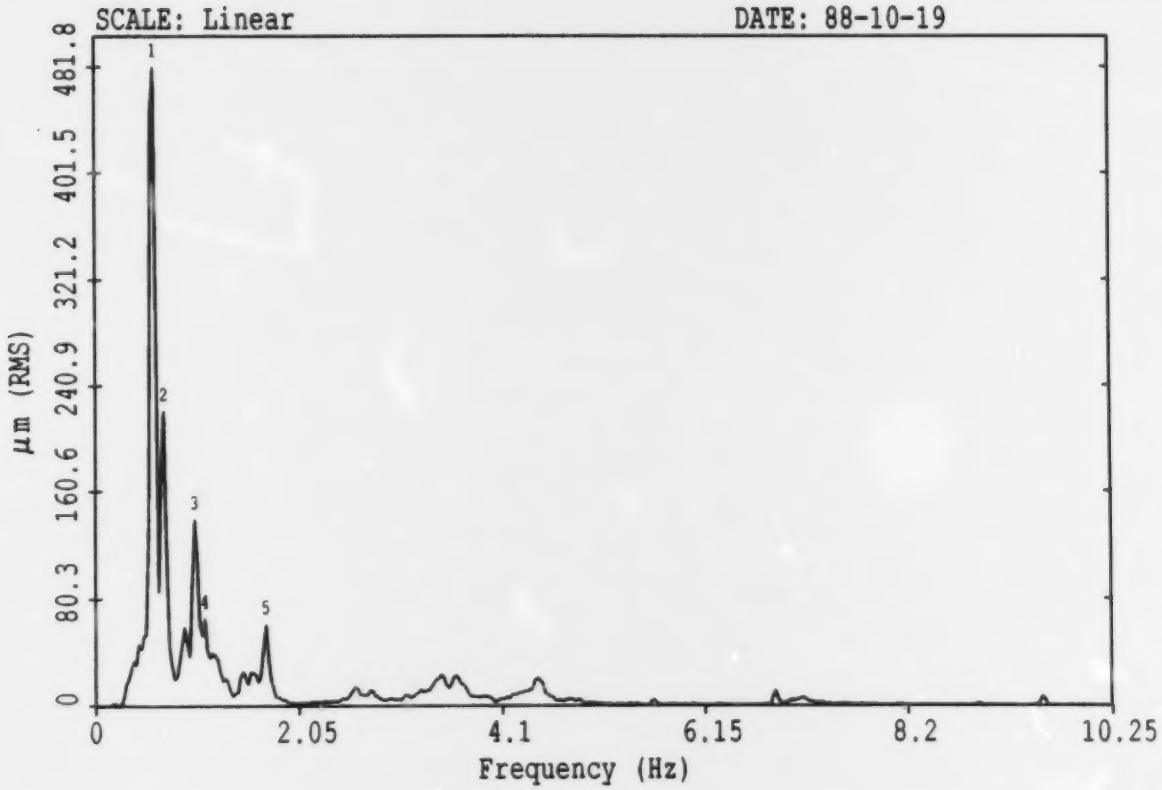


FIGURE A52

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 675 North-South
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.590	374.30
2	0.692	143.10
3	1.718	96.25
4	0.897	45.70
5	1.590	33.90

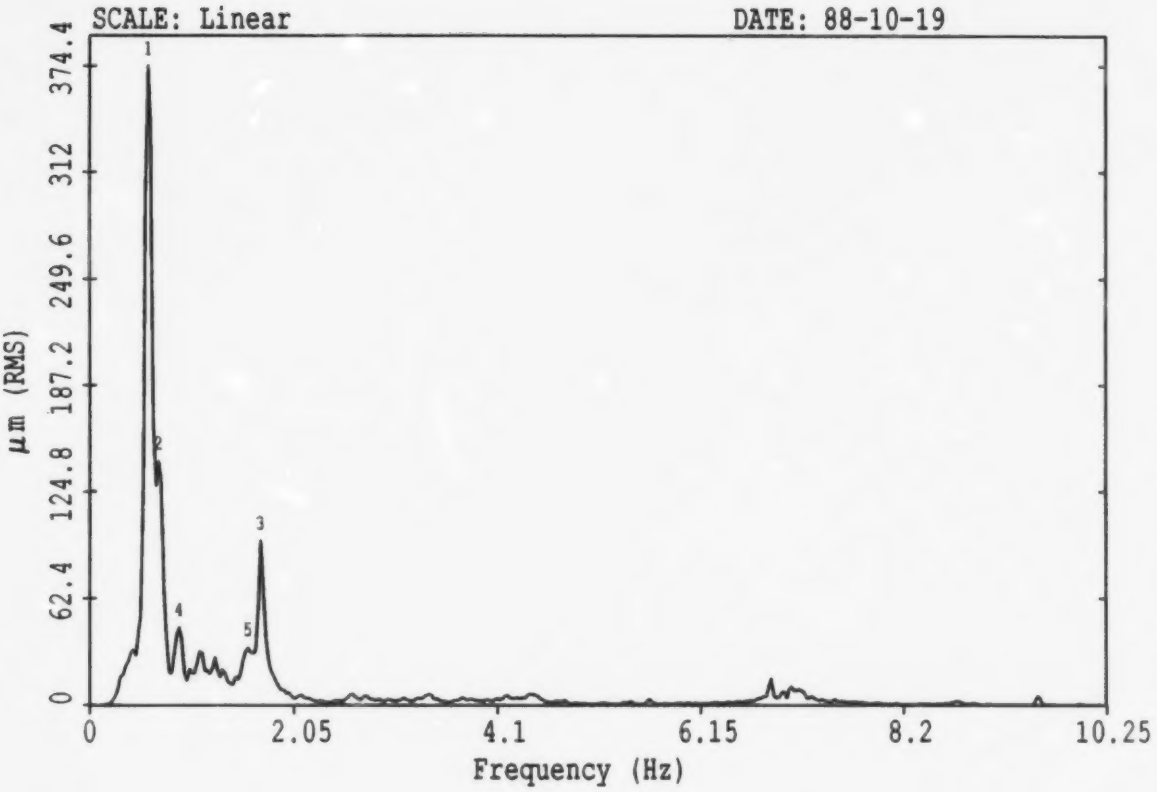


FIGURE A53

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 North-South
PROCESS CONDITION : Hot Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	330.70
2	0.692	213.70
3	1.000	100.90
4	0.897	51.91
5	1.205	37.53

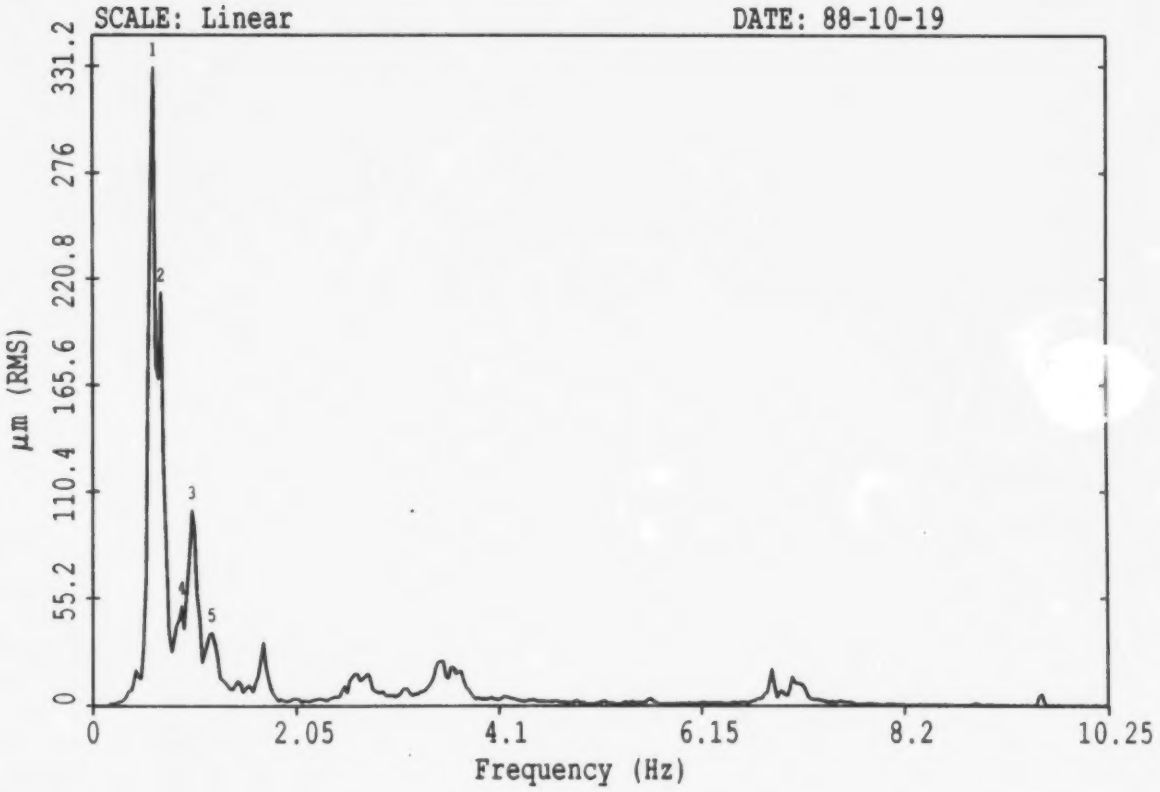


FIGURE A54

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Hot Reheat - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.615	316.80
2	1.000	246.10
3	0.718	204.30
4	1.718	112.60
5	0.872	104.90

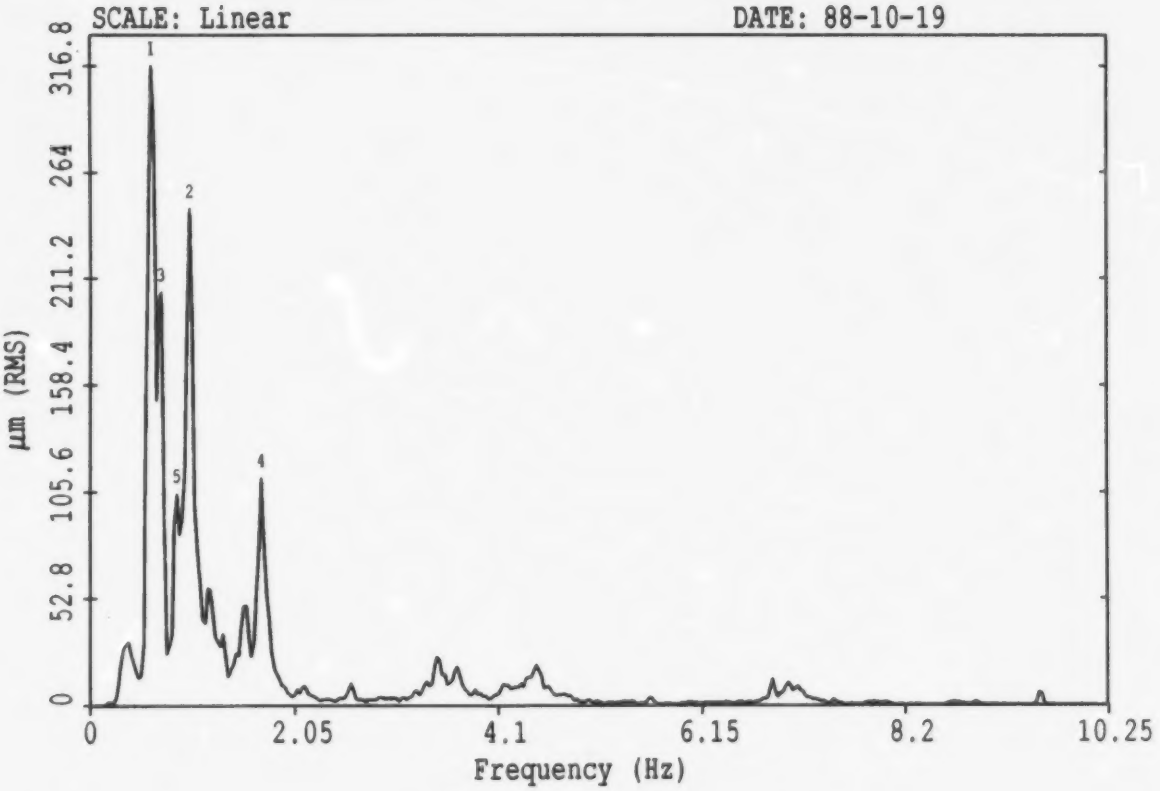


FIGURE A55

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 East-West
PROCESS CONDITION : Main Steam - South Line (on hanger)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.359	235.00
2	0.410	217.60
3	0.462	212.70
4	0.513	150.50
5	0.692	63.81

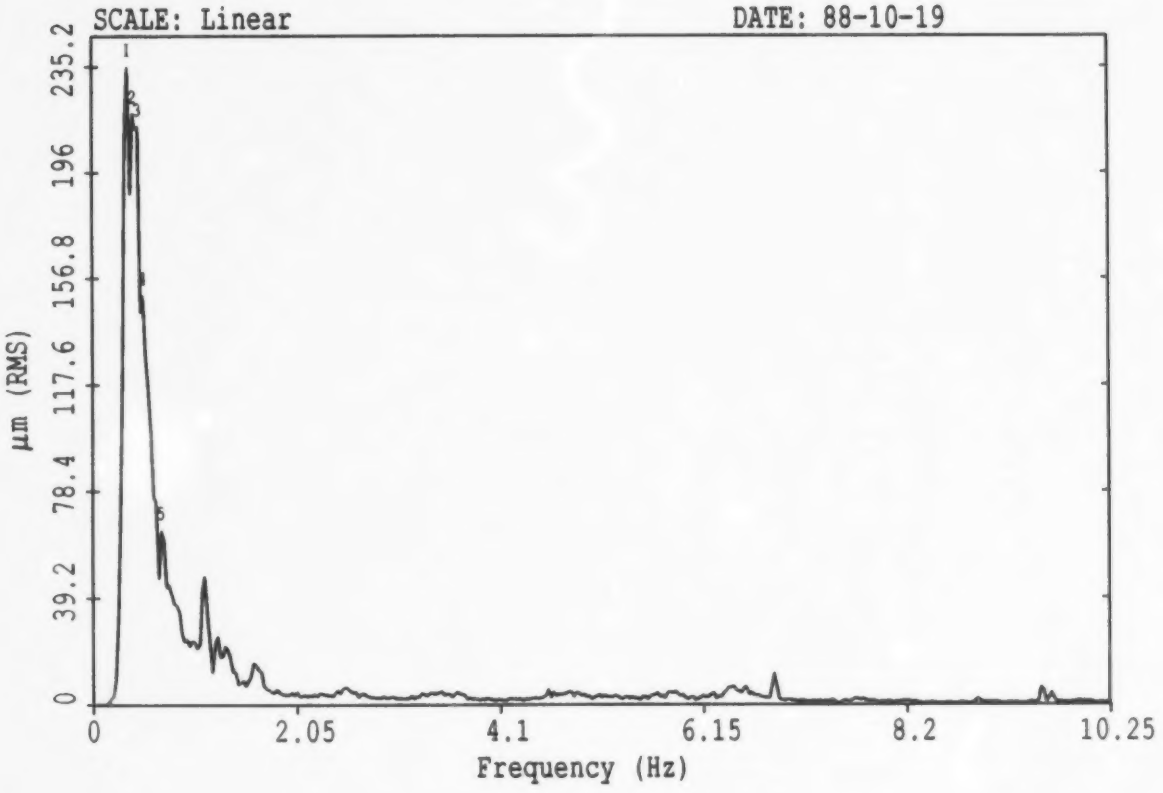


FIGURE A56

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 Vertical
PROCESS CONDITION : Cold Reheat - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.795	25.00
2	1.308	23.60
3	0.718	21.98
4	0.872	20.17
5	1.590	16.97

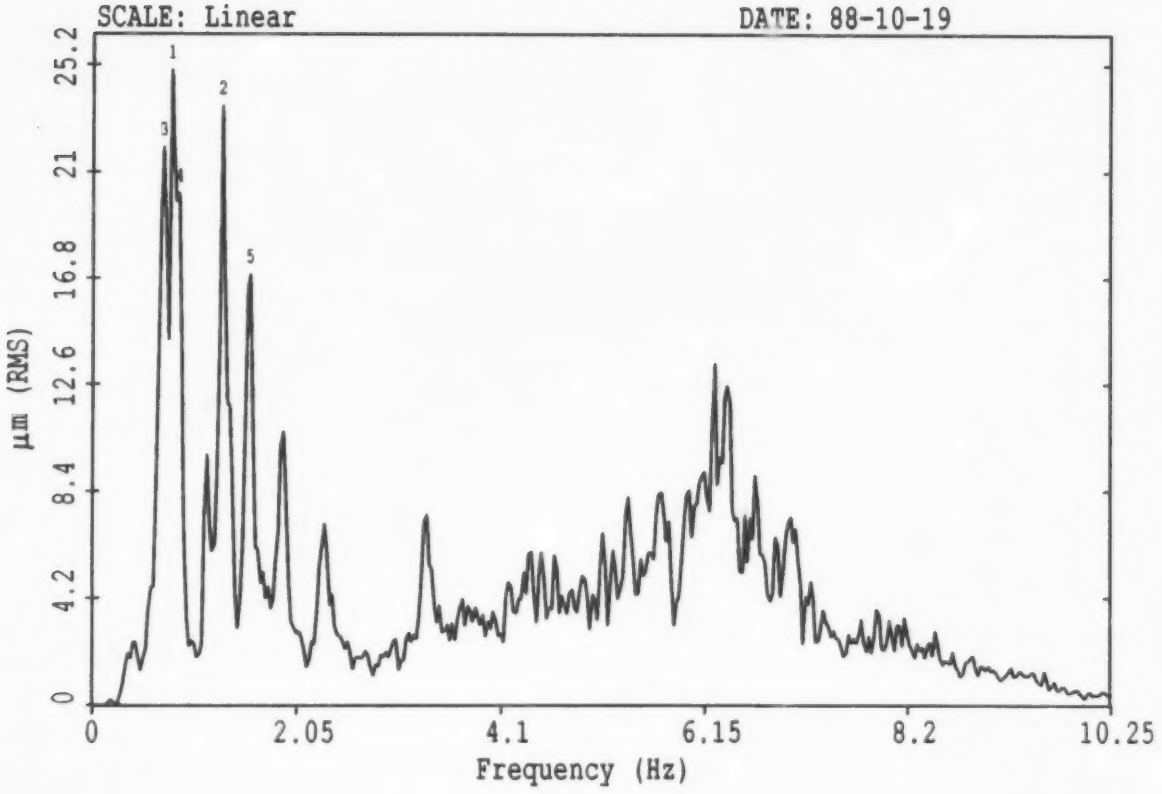


FIGURE A57

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 East-West
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.308	259.80
2	0.872	232.80
3	1.231	162.60
4	0.692	77.21
5	0.641	72.23

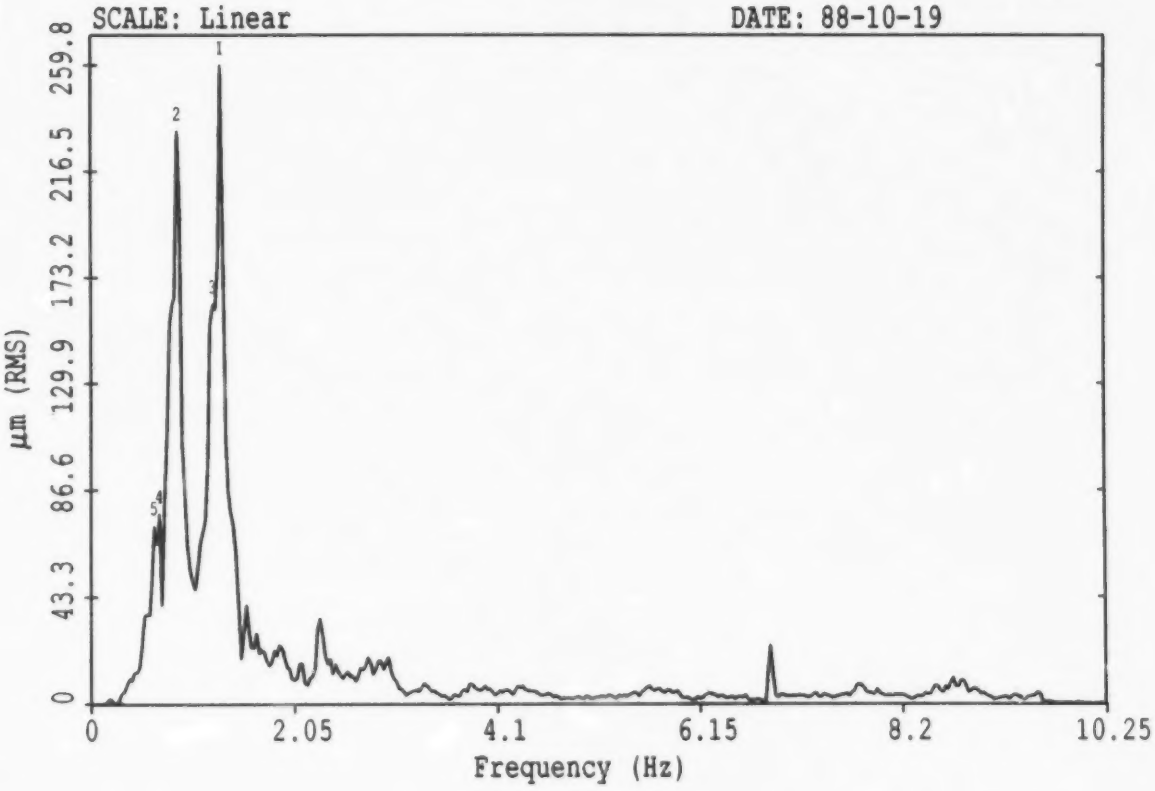


FIGURE A58

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 673 East-West
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.308	150.10
2	1.154	144.00
3	0.846	109.10
4	0.795	95.83
5	1.462	92.19

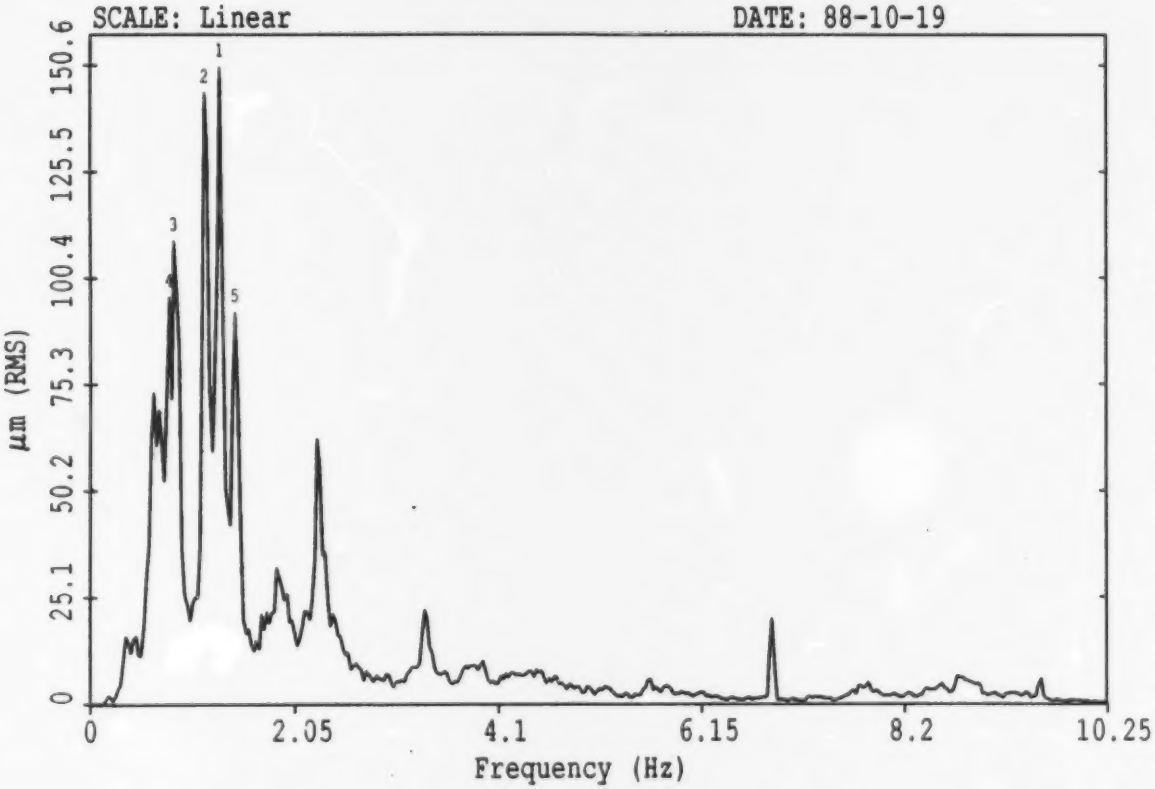


FIGURE A59

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 East-West
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.154	233.70
2	1.487	91.76
3	0.821	51.22
4	0.692	39.26
5	2.308	34.02

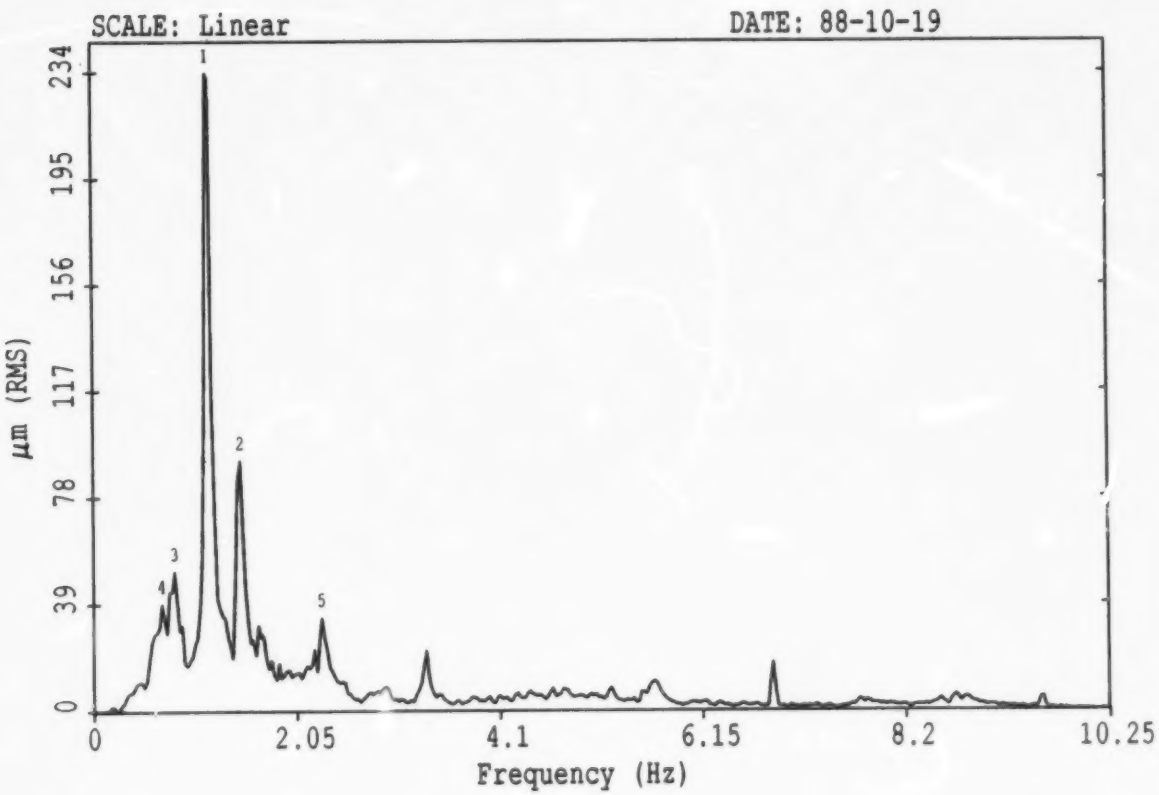


FIGURE A60

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 East-West
PROCESS CONDITION : Cold Reheat - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.154	187.90
2	1.308	180.40
3	1.462	140.20
4	1.256	126.90
5	1.590	68.17

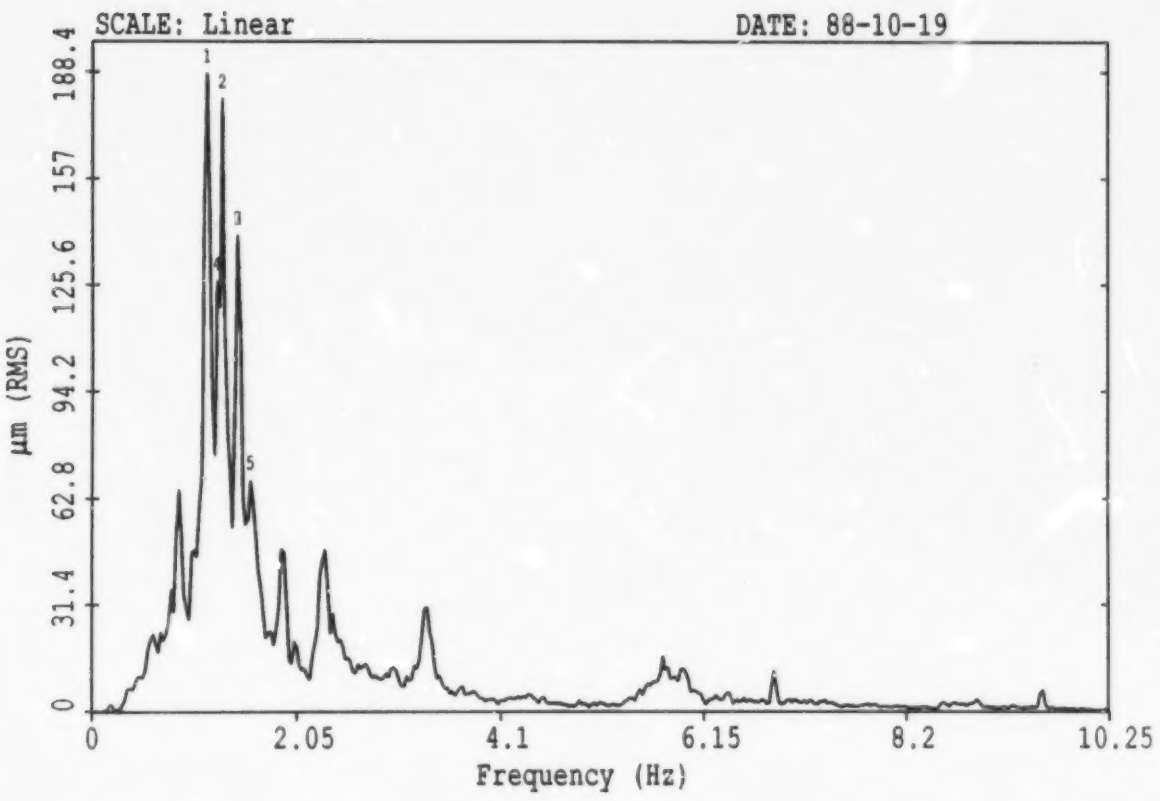


FIGURE A61

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 East-West
PROCESS CONDITION : Cold Reheat - North Line (position: C)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.179	161.50
2	1.308	151.50
3	1.487	103.30
4	0.795	76.49
5	1.590	58.77

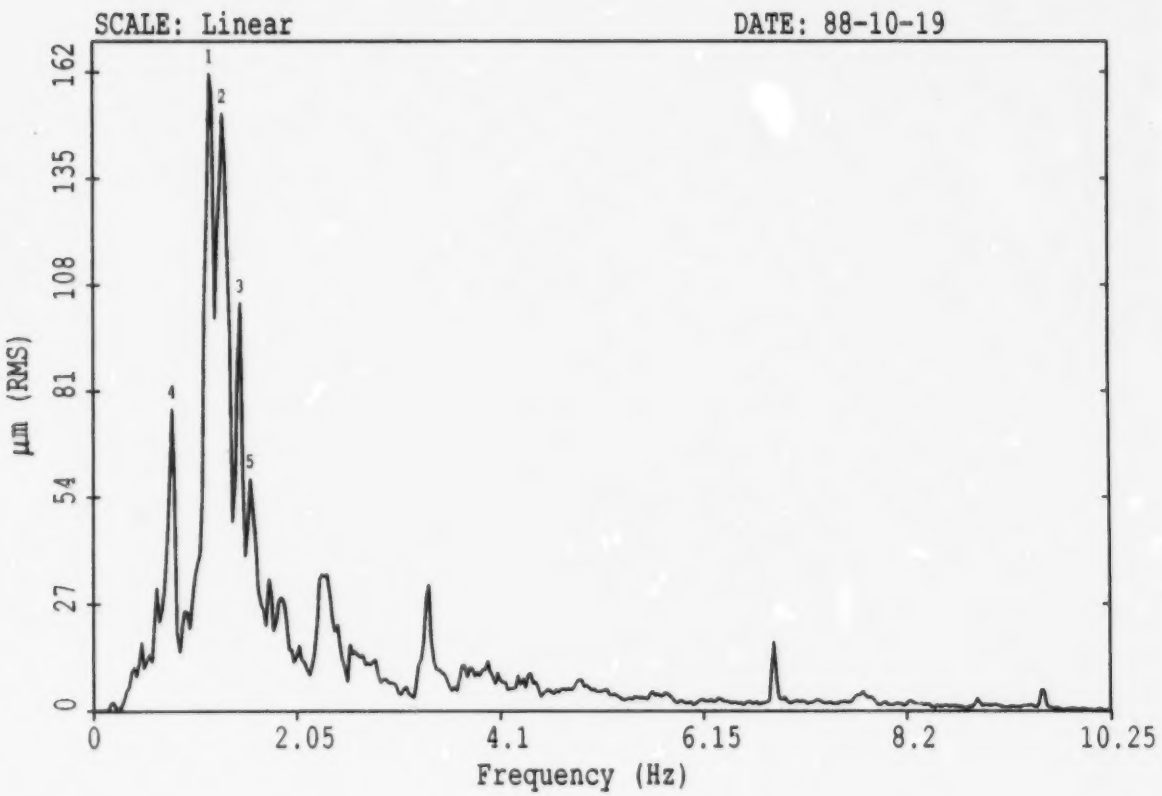


FIGURE A62

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 715 North-South
PROCESS CONDITION : Cold Reheat - North Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.821	77.35
2	0.692	39.09
3	0.436	36.52
4	0.615	35.24
5	1.154	28.82

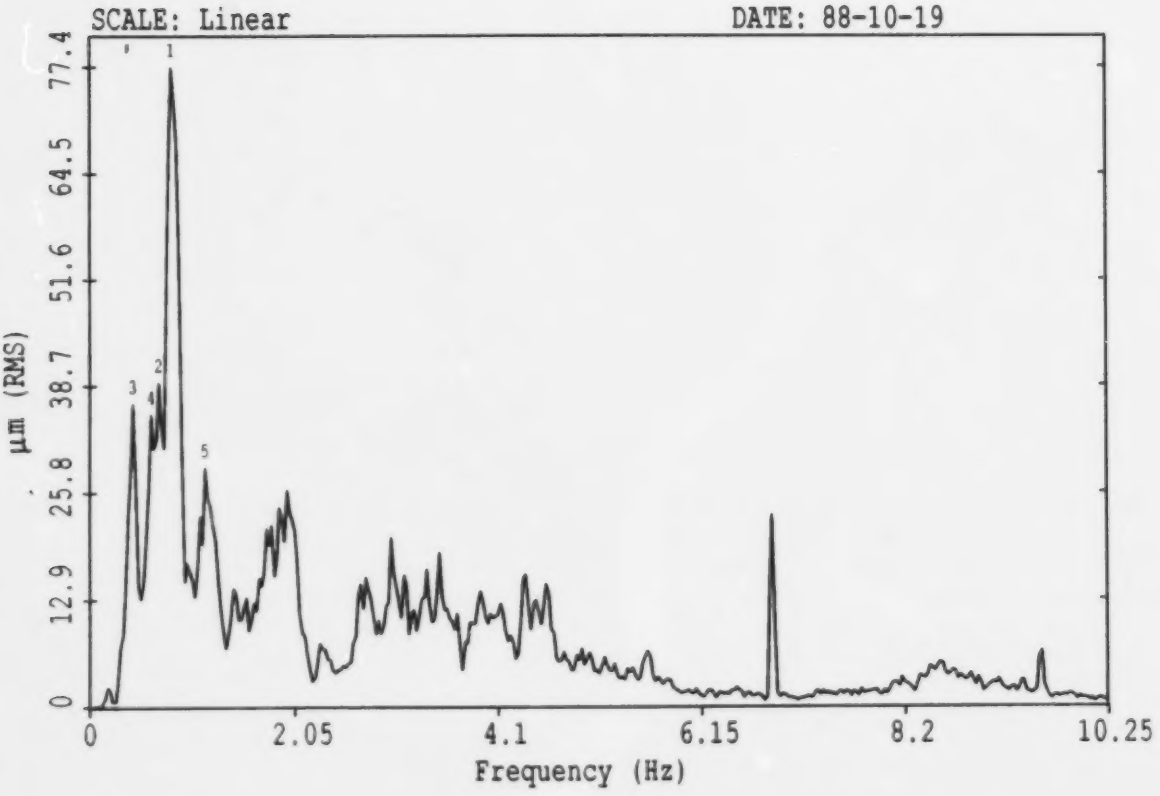


FIGURE A63

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 North-South
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	356.00
2	1.308	189.40
3	1.179	115.50
4	1.462	87.71
5	0.564	70.37

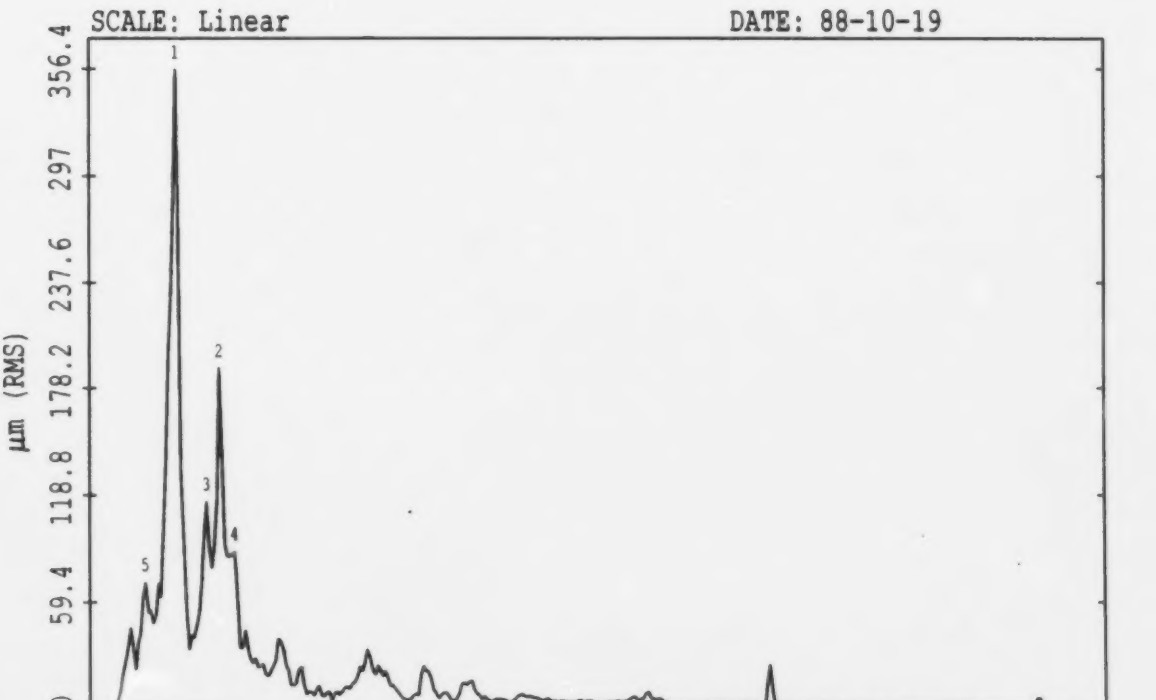


FIGURE A64

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 673 North-South
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.846	212.00
2	1.308	165.30
3	0.692	122.60
4	1.154	102.30
5	1.462	87.27

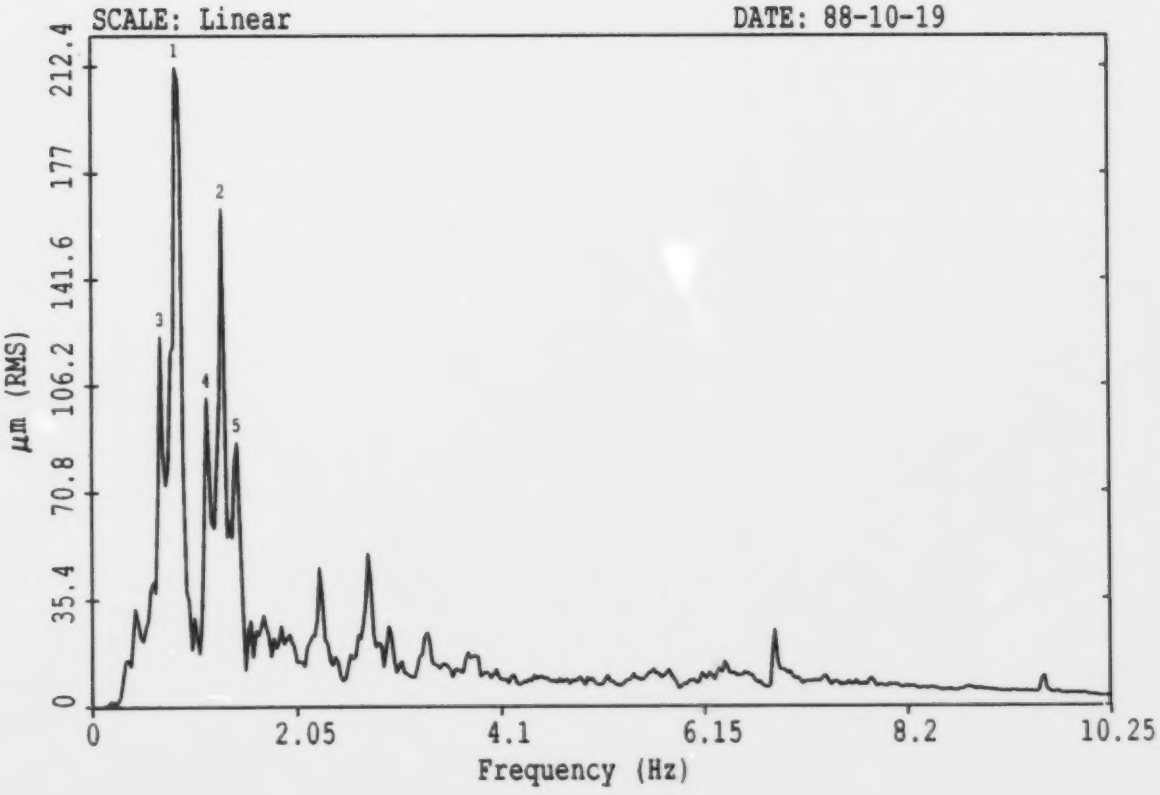


FIGURE A65

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 North-South
PROCESS CONDITION : Cold Reheat - North Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.719	89.53
2	1.590	42.21
3	2.769	37.72
4	0.795	32.22
5	1.513	30.93

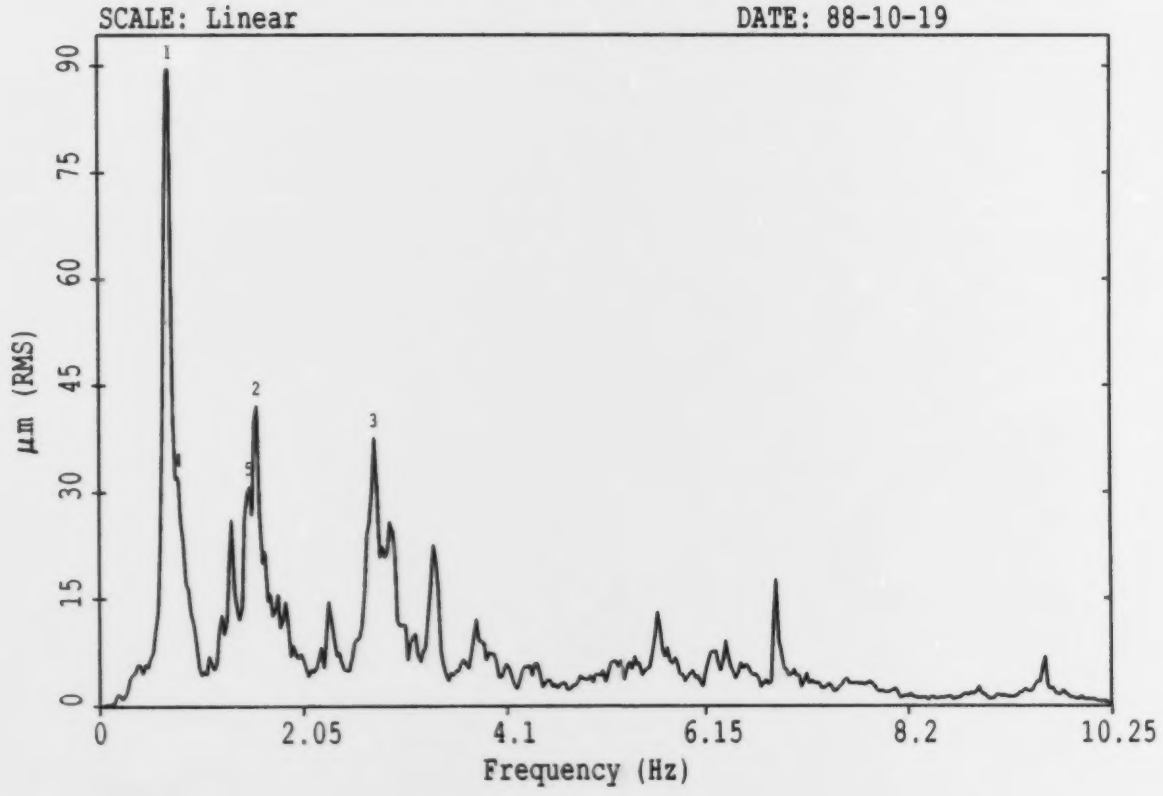


FIGURE A66

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Cold Reheat - North Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.308	281.40
2	0.795	169.10
3	0.718	153.30
4	1.564	109.50
5	1.487	74.50

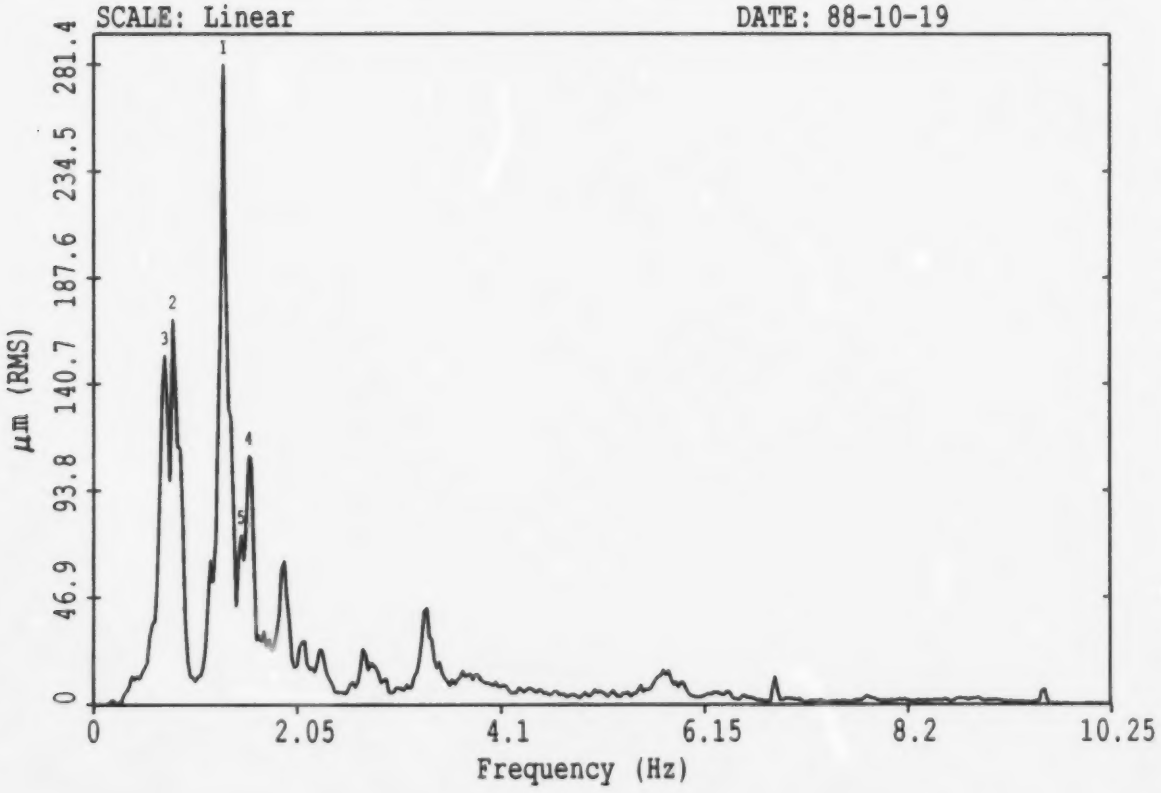


FIGURE A67

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Cold Reheat - North Line (position: C)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	3.385	133.40
2	1.333	26.93
3	3.718	26.84
4	3.795	26.13
5	1.590	20.01

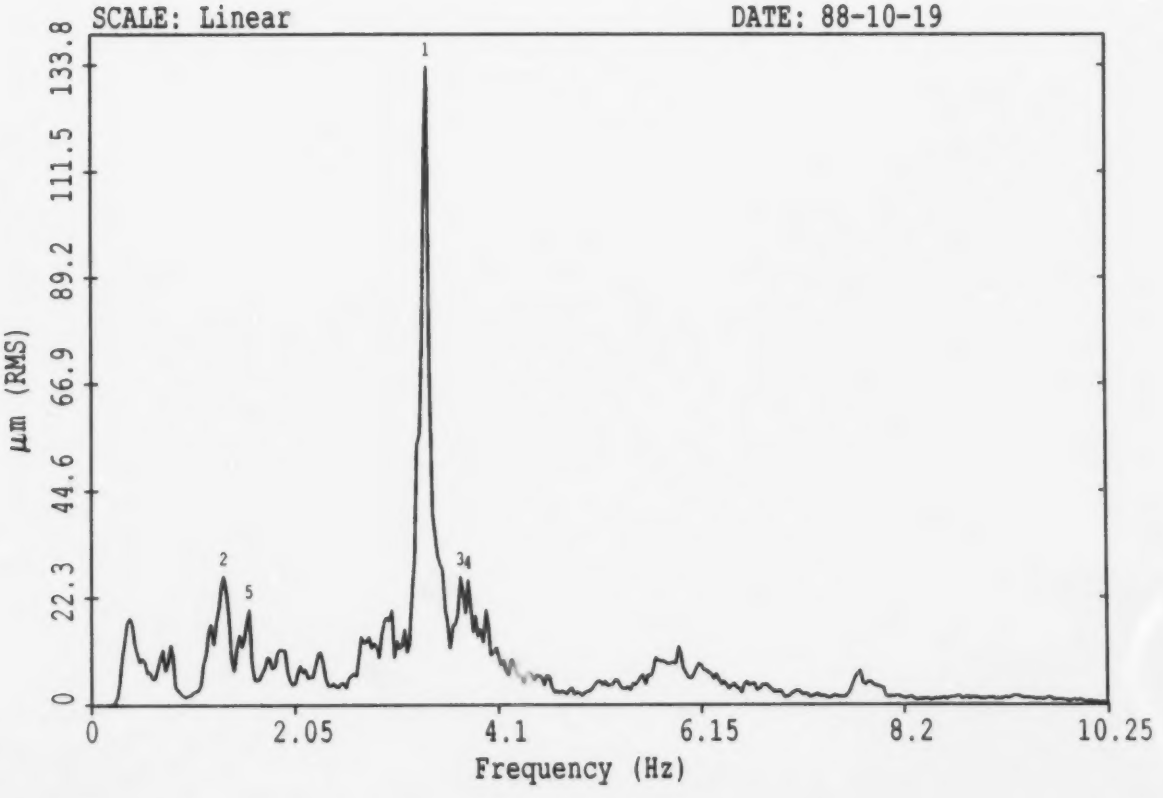


FIGURE A68

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 Vertical
PROCESS CONDITION : Cold Reheat - South Line (position: D)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.462	9.31
2	5.744	7.25
3	3.359	7.13
4	1.590	6.17
5	5.795	5.41

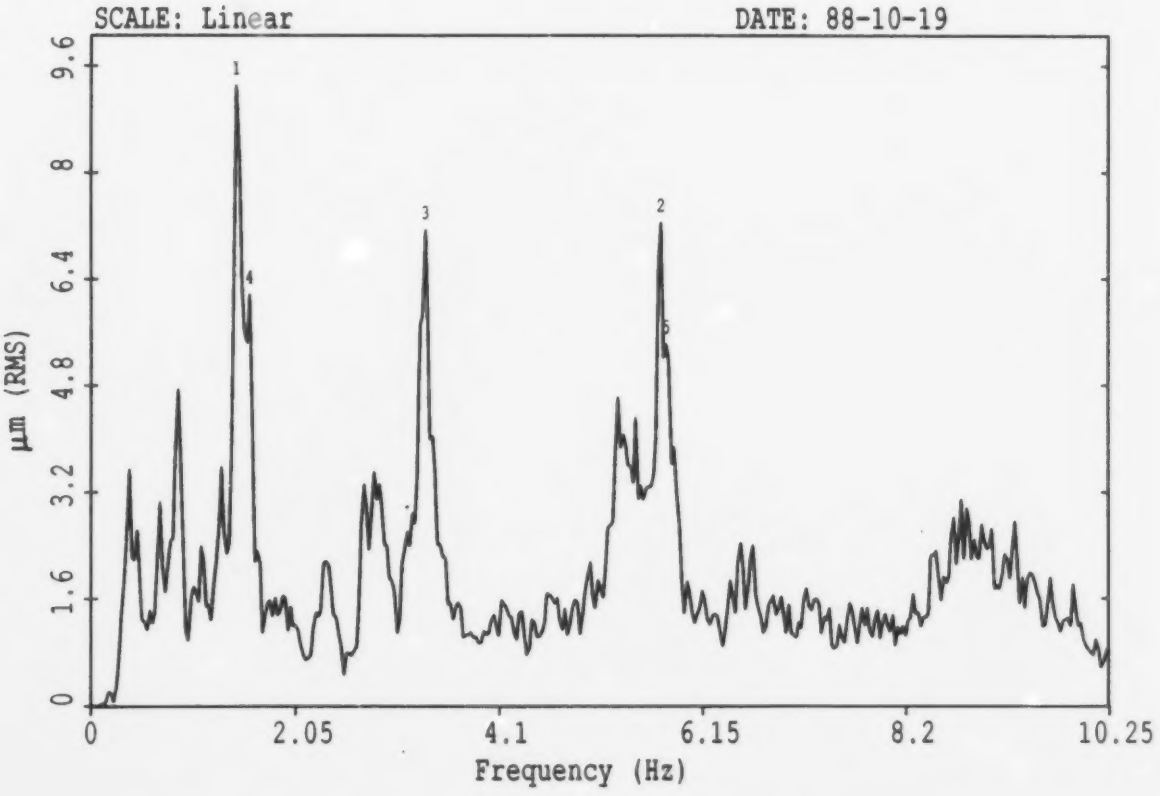


FIGURE A69

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 715 North-South
PROCESS CONDITION : Cold Reheat - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	47.09
2	0.692	39.69
3	0.436	22.76
4	1.231	20.55
5	1.769	18.57

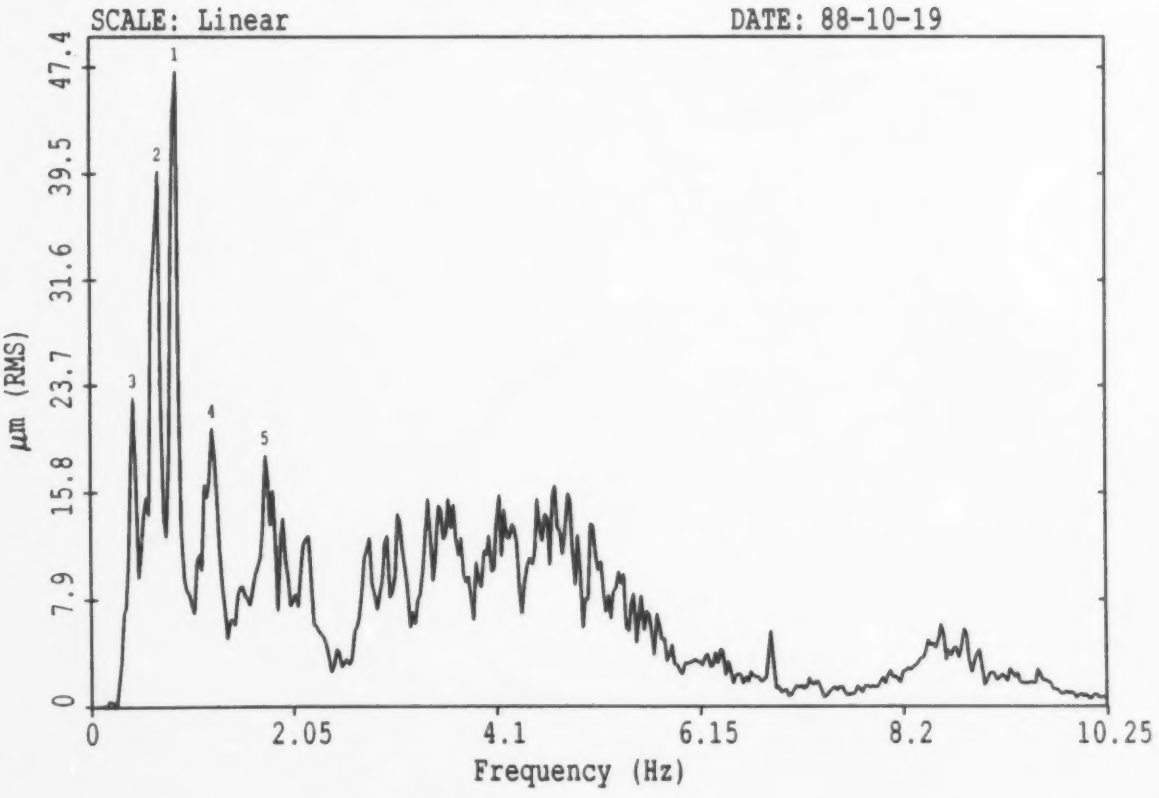


FIGURE A70

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 715 North-South
PROCESS CONDITION : Cold Reheat - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	60.37
2	0.692	47.74
3	0.436	23.50
4	3.590	19.65
5	3.641	18.74

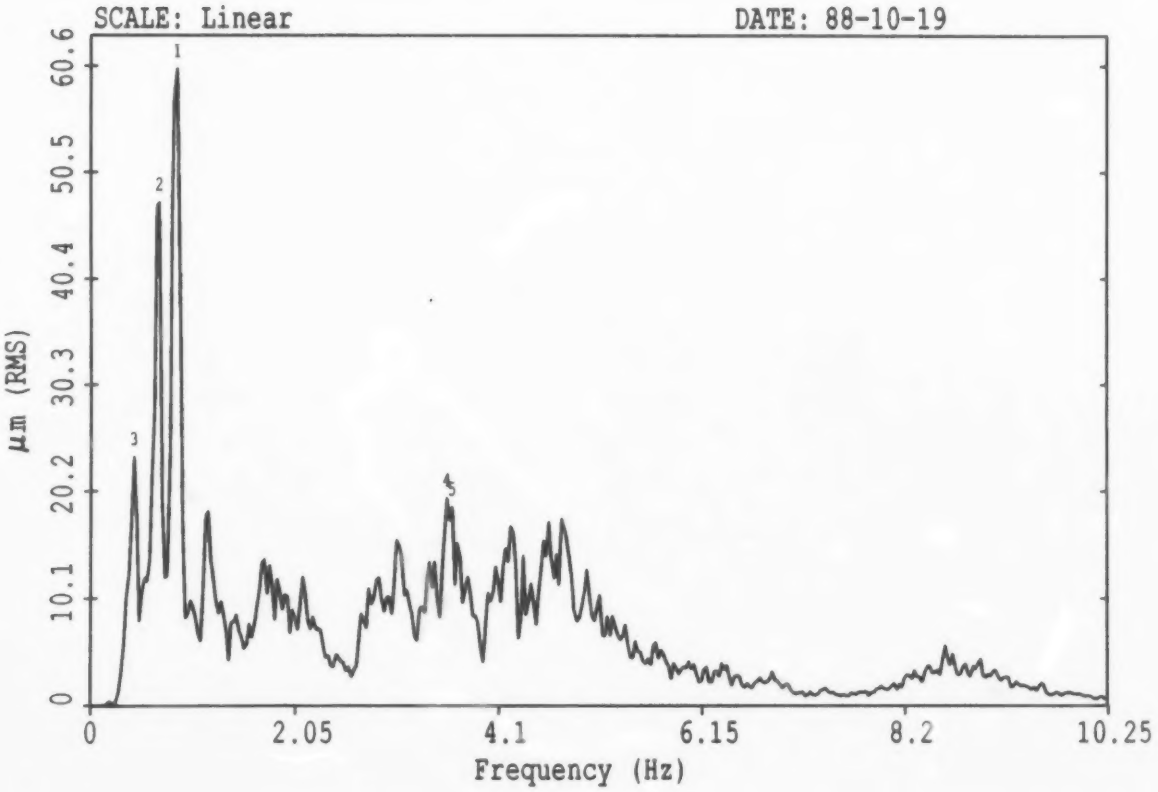


FIGURE A71

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 North-South
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	270.50
2	1.154	84.07
3	0.667	55.91
4	1.897	49.17
5	1.795	41.93

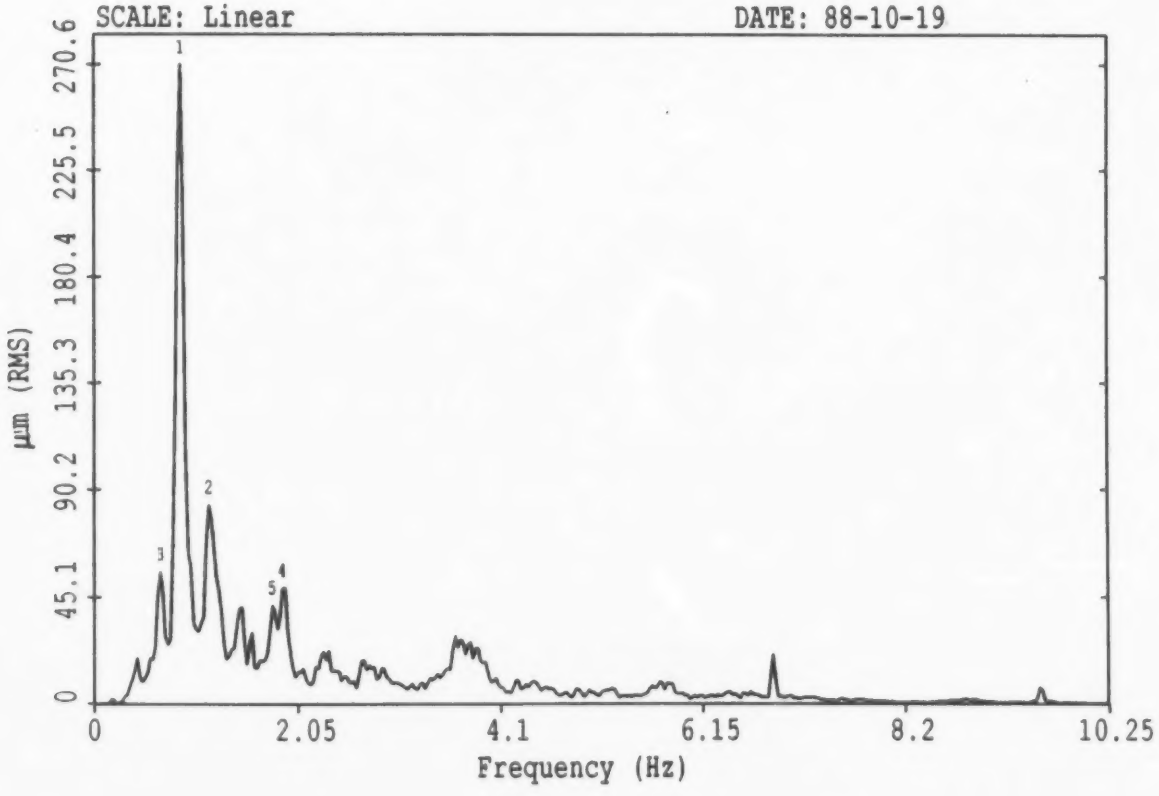


FIGURE A72

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 672 North-South
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	105.00
2	1.923	84.02
3	1.256	61.84
4	1.154	60.04
5	0.692	57.03

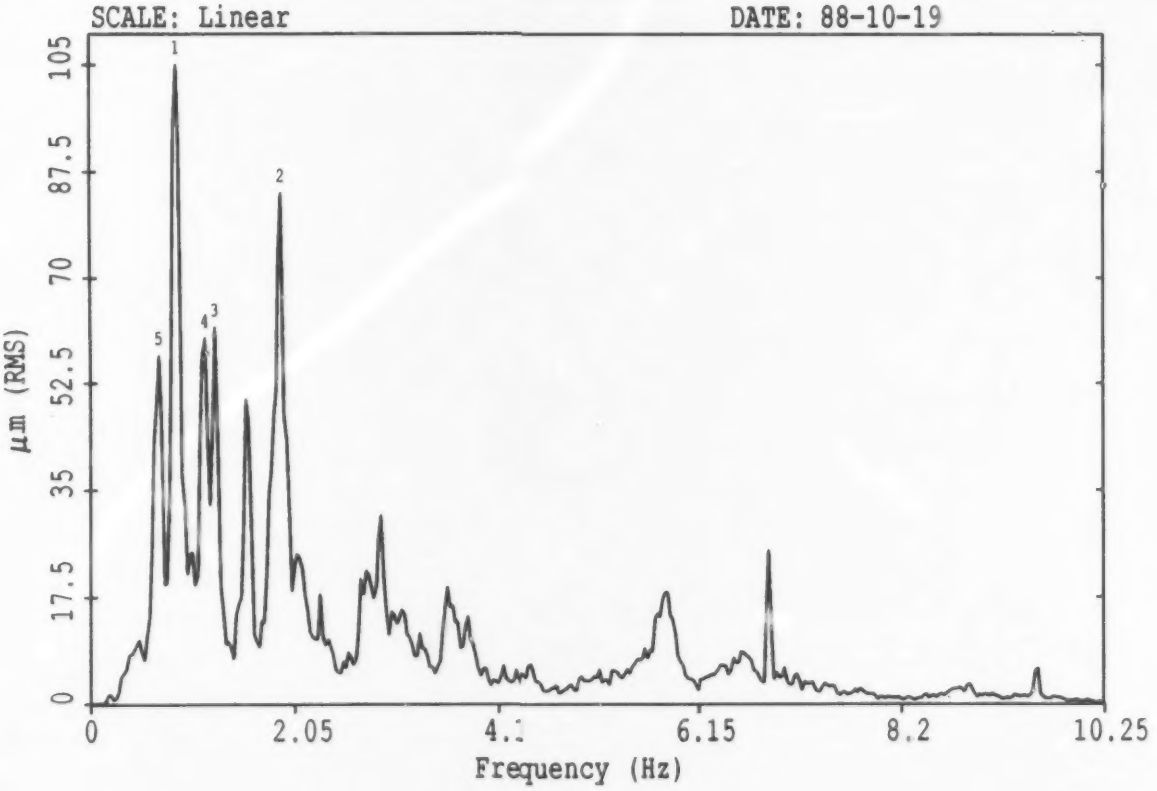


FIGURE A73

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 North-South
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.692	139.70
2	1.333	71.56
3	1.154	60.13
4	1.256	43.16
5	1.487	42.73

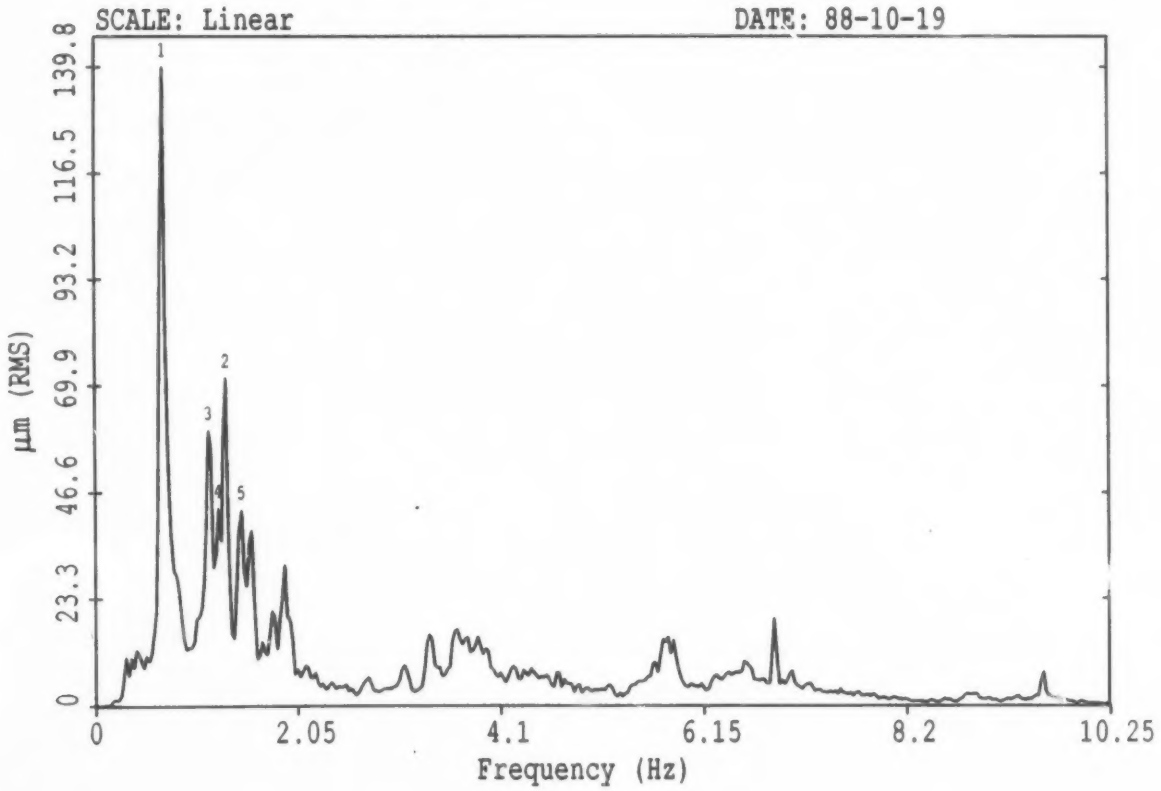


FIGURE A74

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Cold Reheat - South Line (position: C)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.308	153.10
2	1.487	145.30
3	0.692	136.20
4	0.846	130.50
5	1.590	116.50

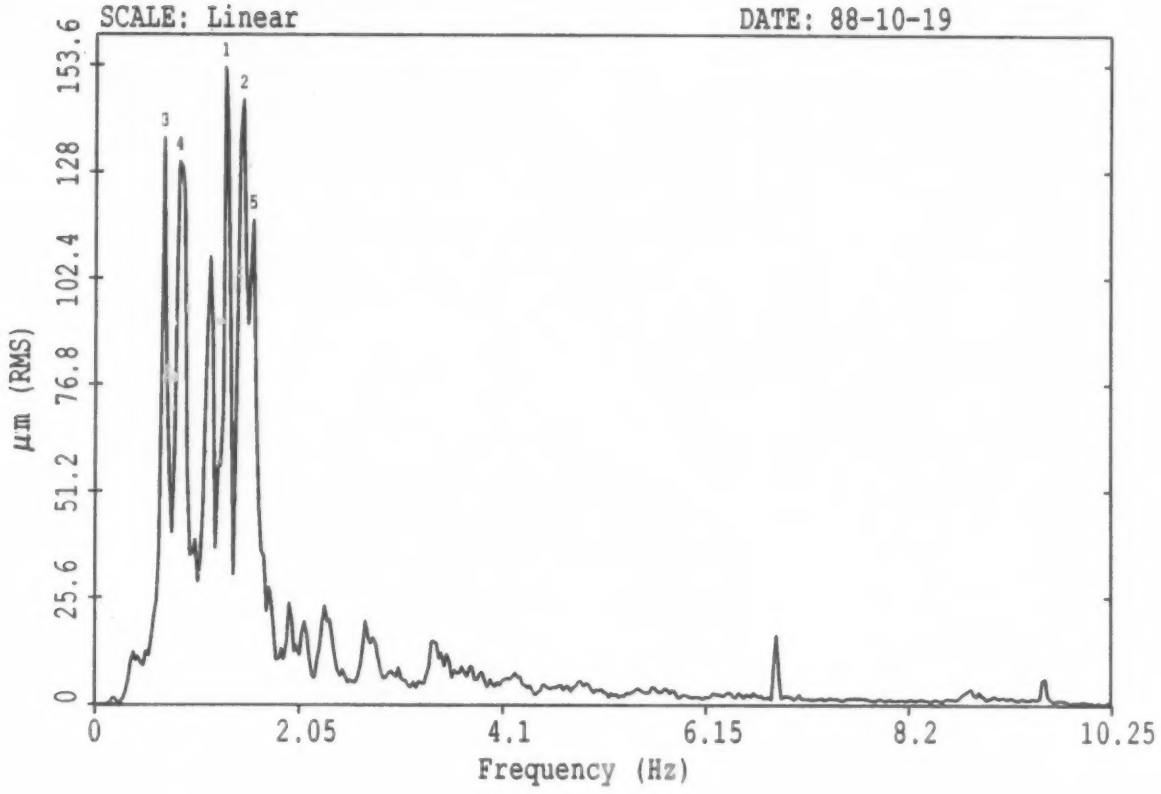


FIGURE A75

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Cold Reheat - South Line (position: D)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	3.359	43.91
2	1.590	27.25
3	1.462	26.60
4	5.744	22.01
5	5.795	19.91

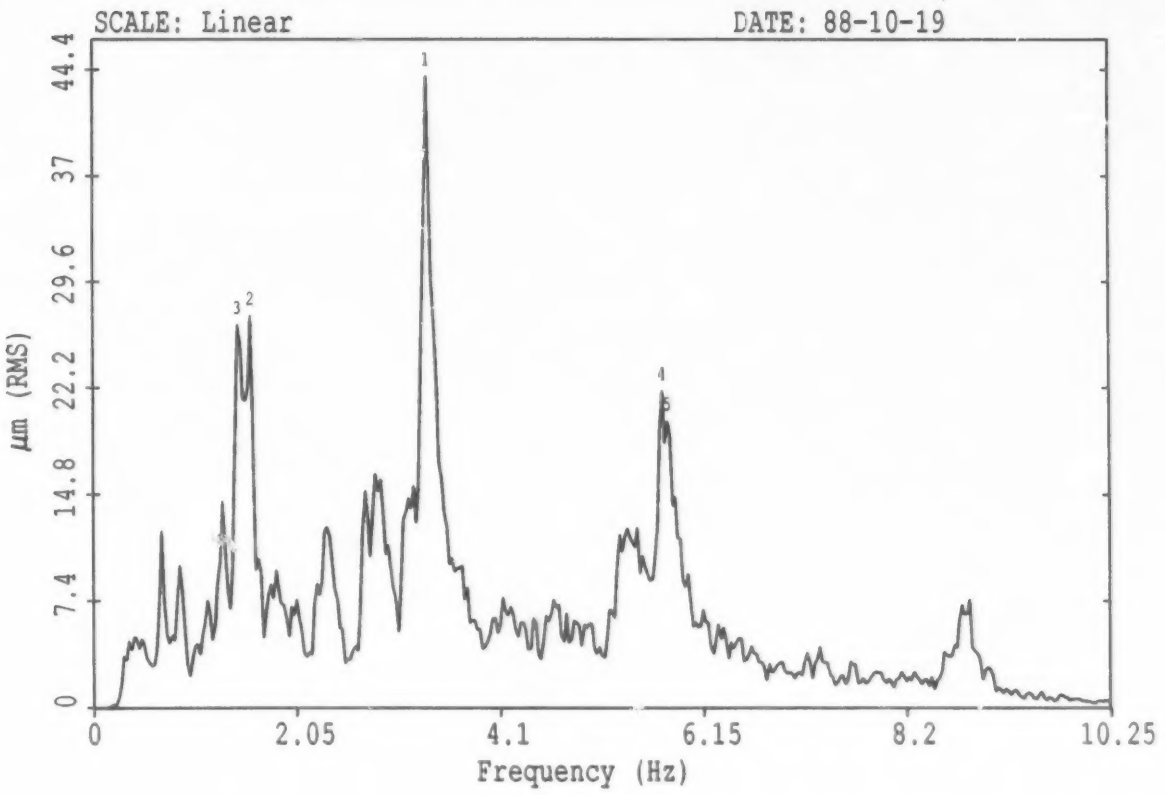


FIGURE A76

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 North-South
PROCESS CONDITION : Cold Reheat - South Line (position: E)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	3.385	38.37
2	5.820	36.55
3	3.436	31.97
4	5.692	25.13
5	5.359	23.70

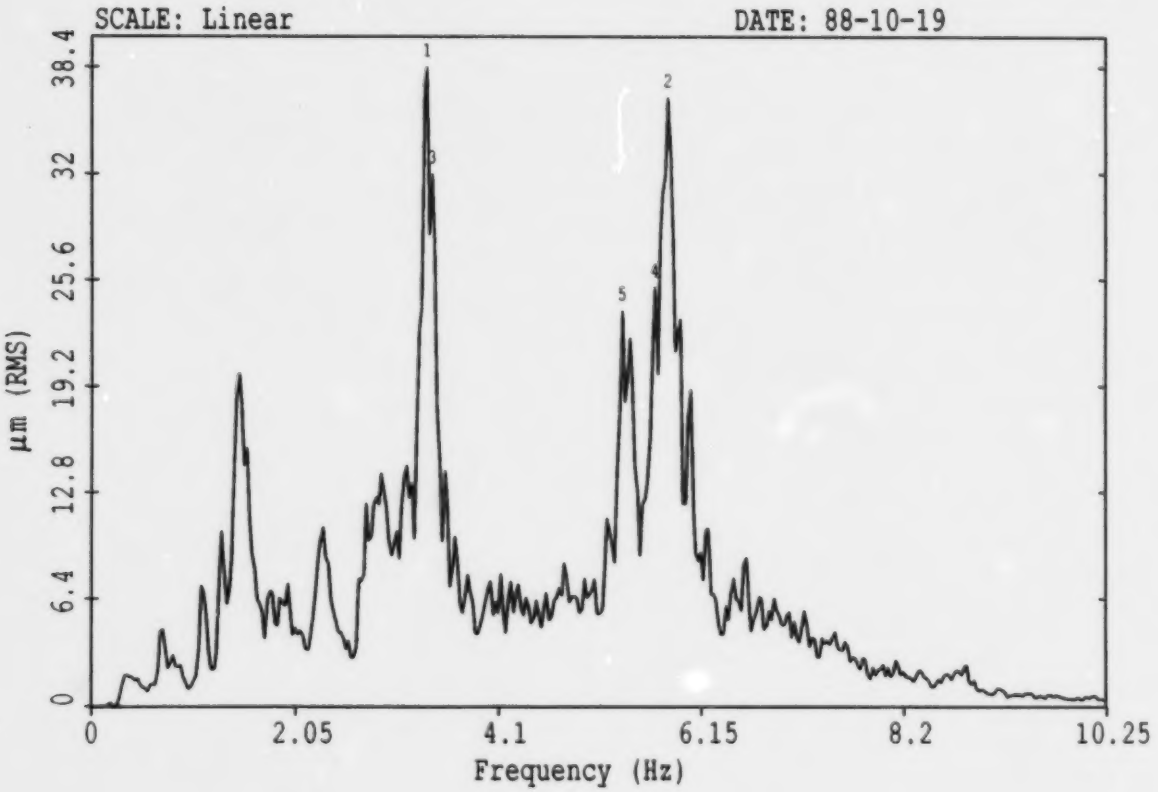


FIGURE A77

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 715 East-West
PROCESS CONDITION : Cold Reheat - South Line (position: B)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.641	92.28
2	1.231	78.78
3	0.538	50.67
4	0.462	46.26
5	1.103	44.45

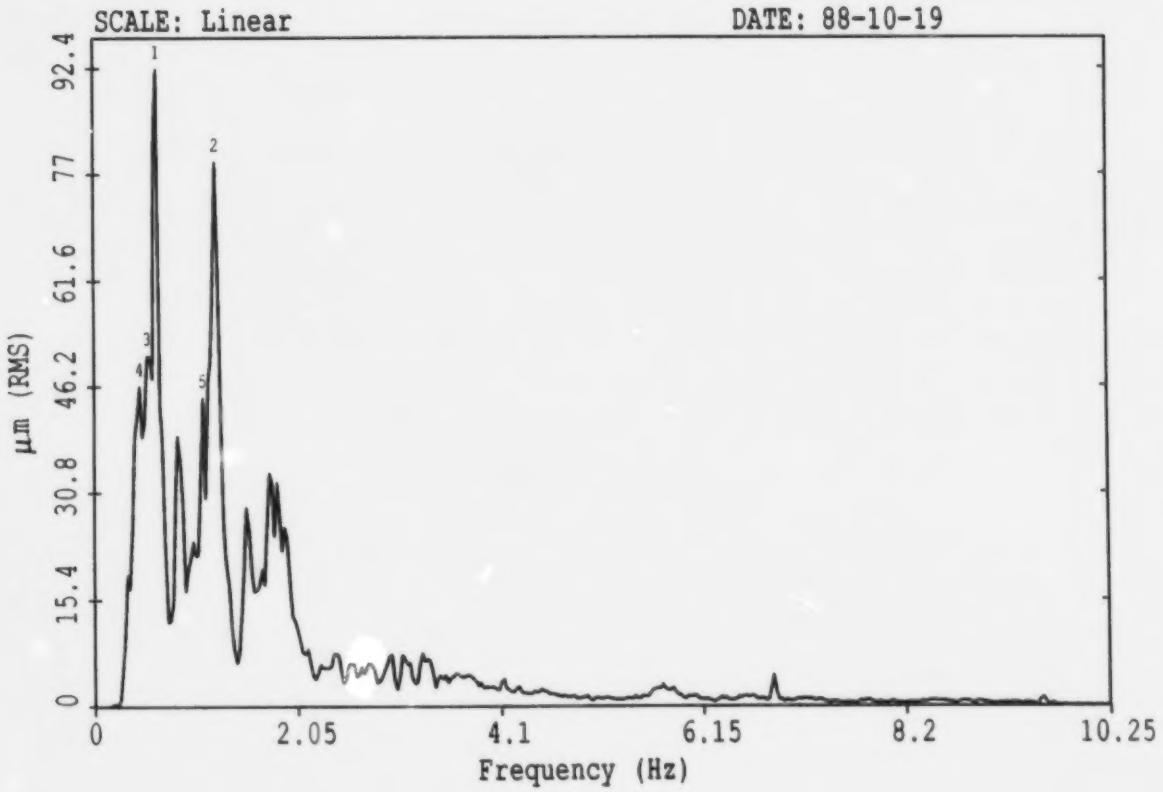


FIGURE A78

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 715 East-West
PROCESS CONDITION : Cold Reheat - South Line (position: A)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.846	186.50
2	0.615	112.00
3	0.692	69.77
4	0.538	57.48
5	1.923	51.48

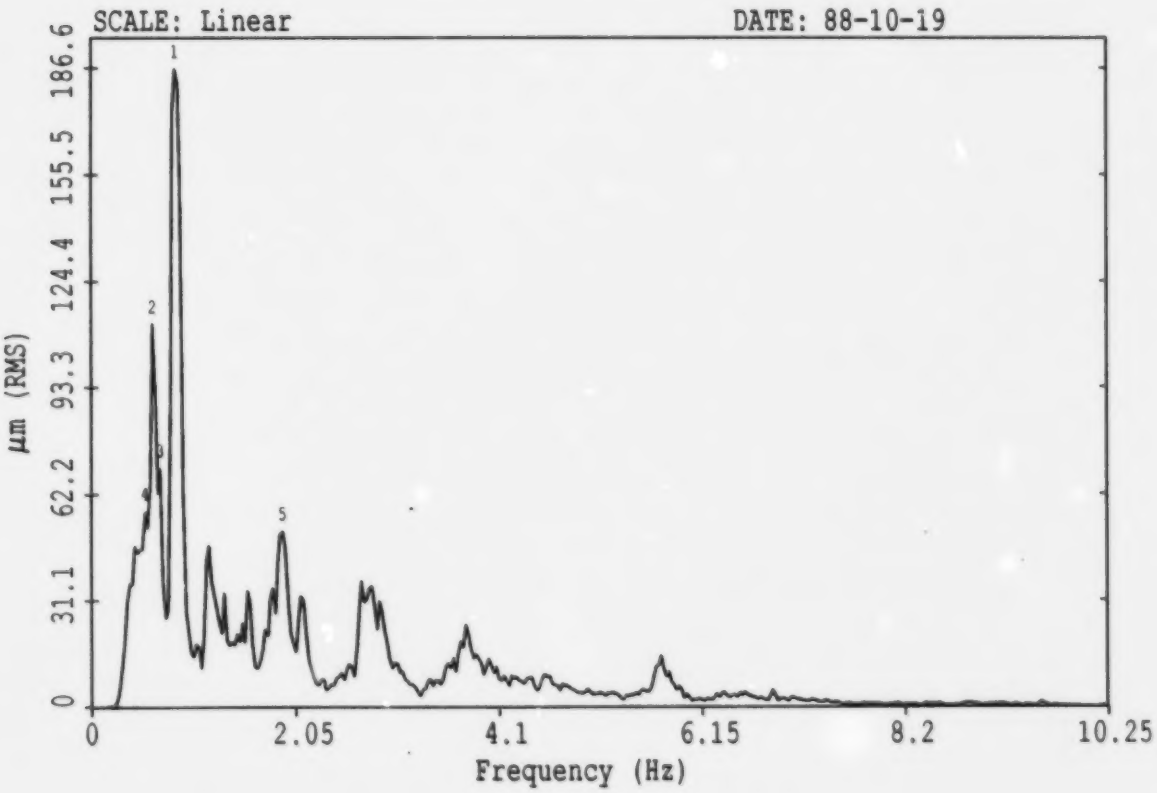


FIGURE A79

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 710 East-West
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	402.20
2	0.641	104.90
3	1.179	89.59
4	1.487	49.14
5	1.256	37.58

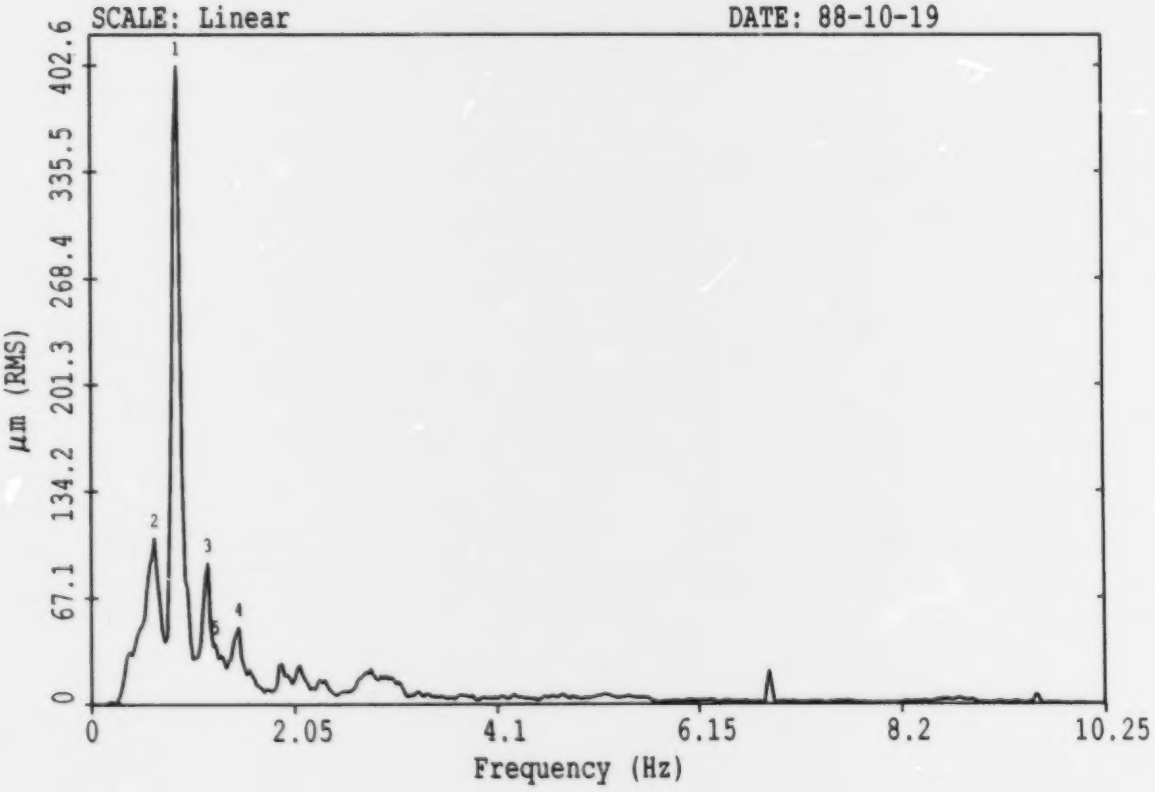


FIGURE A80

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 672 East-West
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	0.872	208.50
2	0.641	95.70
3	0.513	53.97
4	1.256	43.75
5	2.308	40.95

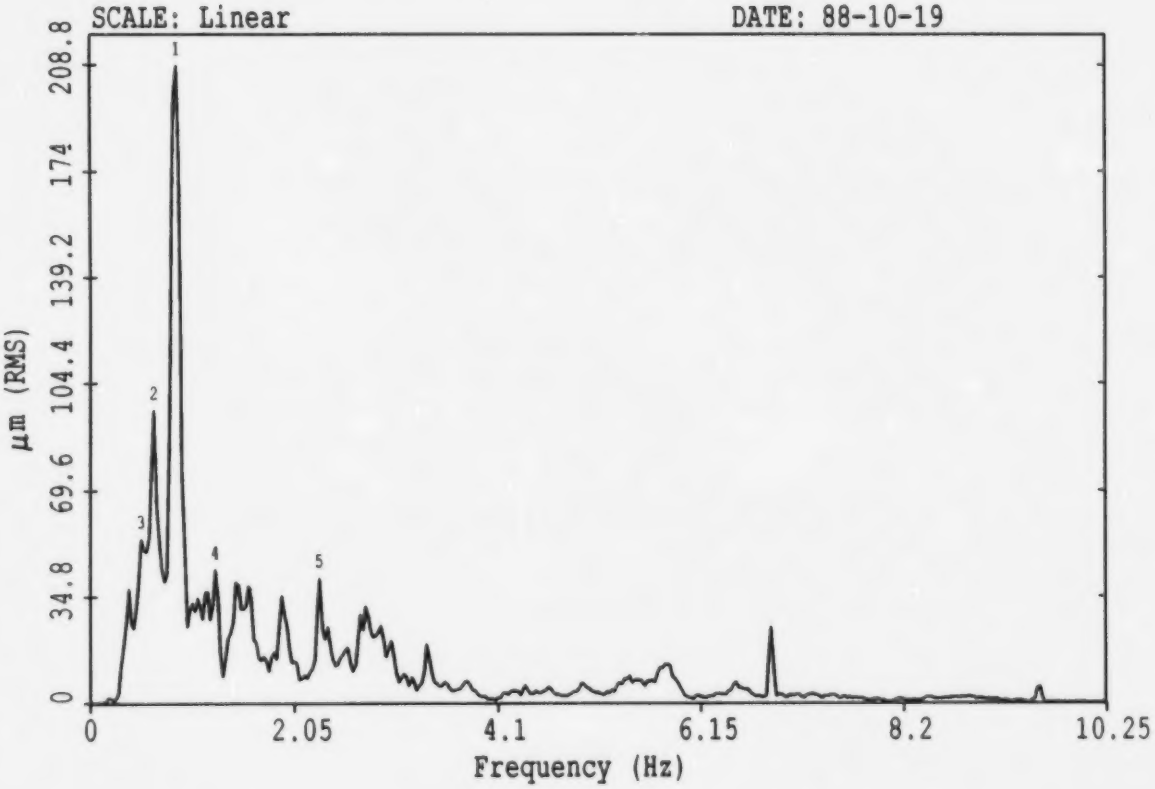


FIGURE A81

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 628 East-West
PROCESS CONDITION : Cold Reheat - South Line

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.462	187.50
2	0.872	114.70
3	1.179	86.34
4	0.667	49.29
5	1.333	46.27

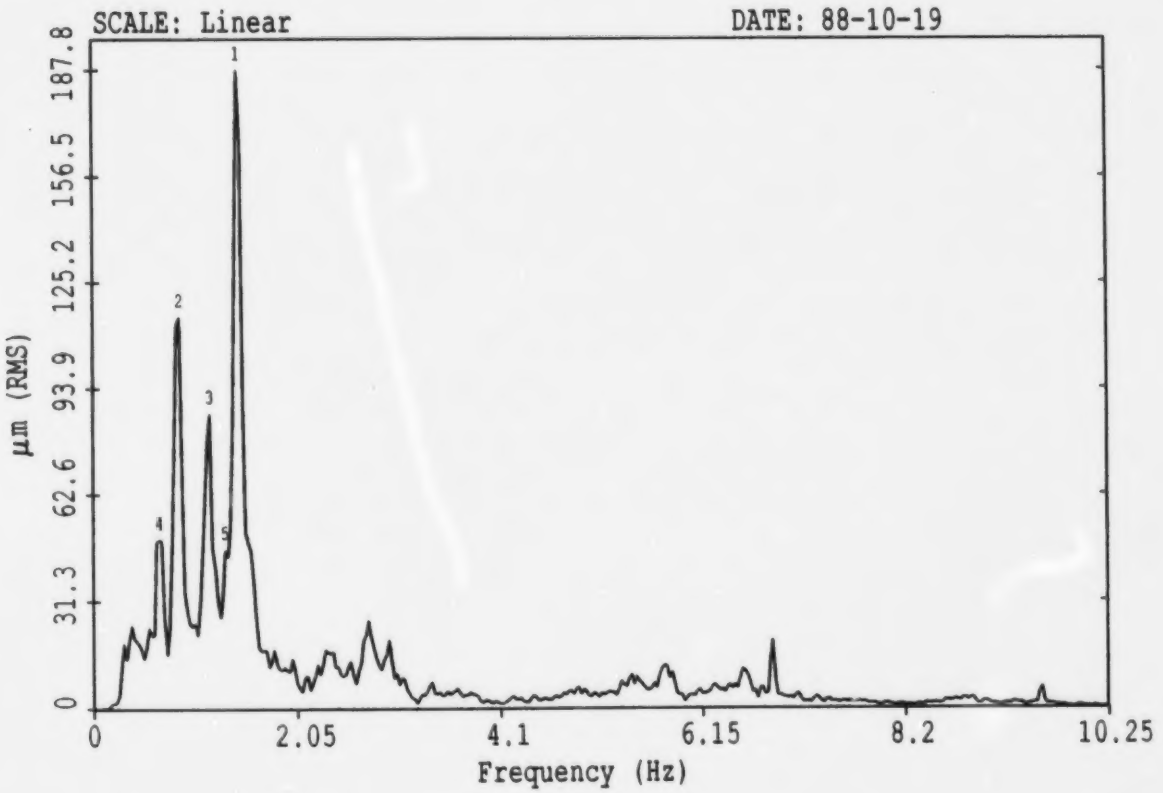


FIGURE A82

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 East-West
PROCESS CONDITION : Cold Reheat - South Line (position: C)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.462	201.90
2	1.154	88.16
3	1.256	62.18
4	1.974	43.50
5	2.103	42.39

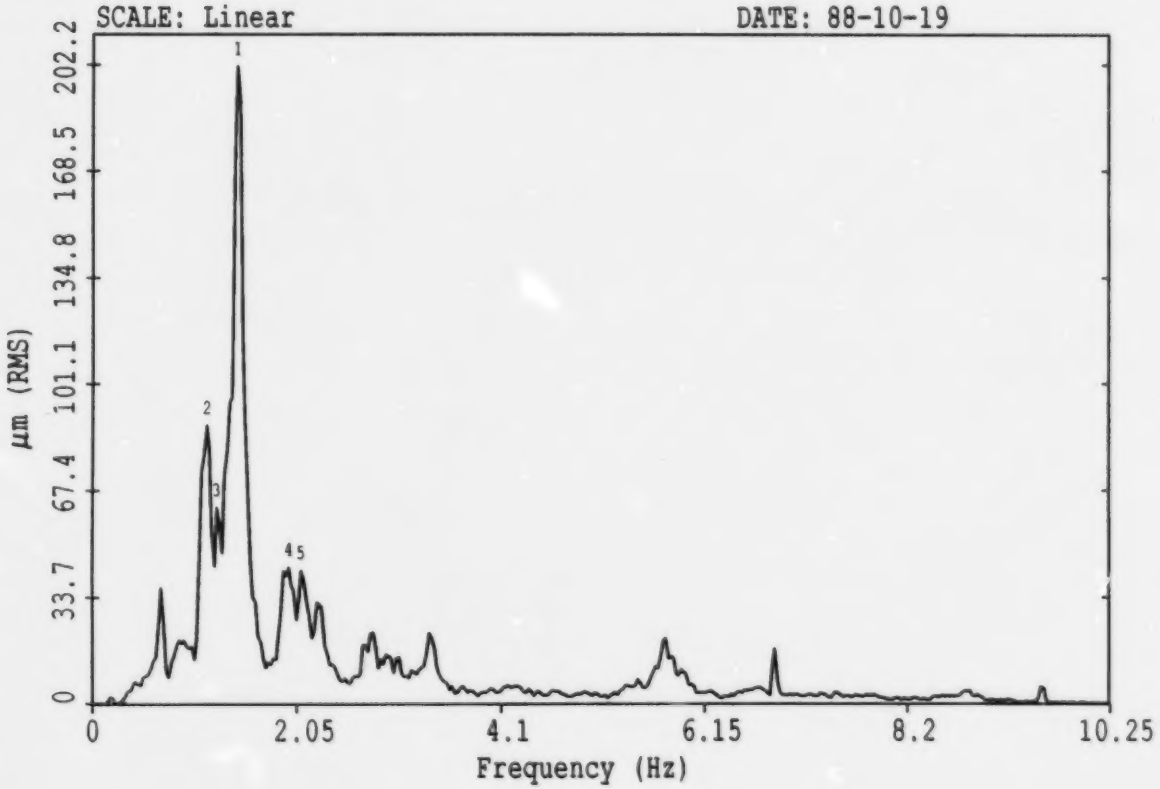


FIGURE A83

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 East-West
PROCESS CONDITION : Cold Reheat - South Line (position: D)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.462	221.60
2	0.872	64.90
3	1.308	61.18
4	1.128	55.56
5	1.949	51.46

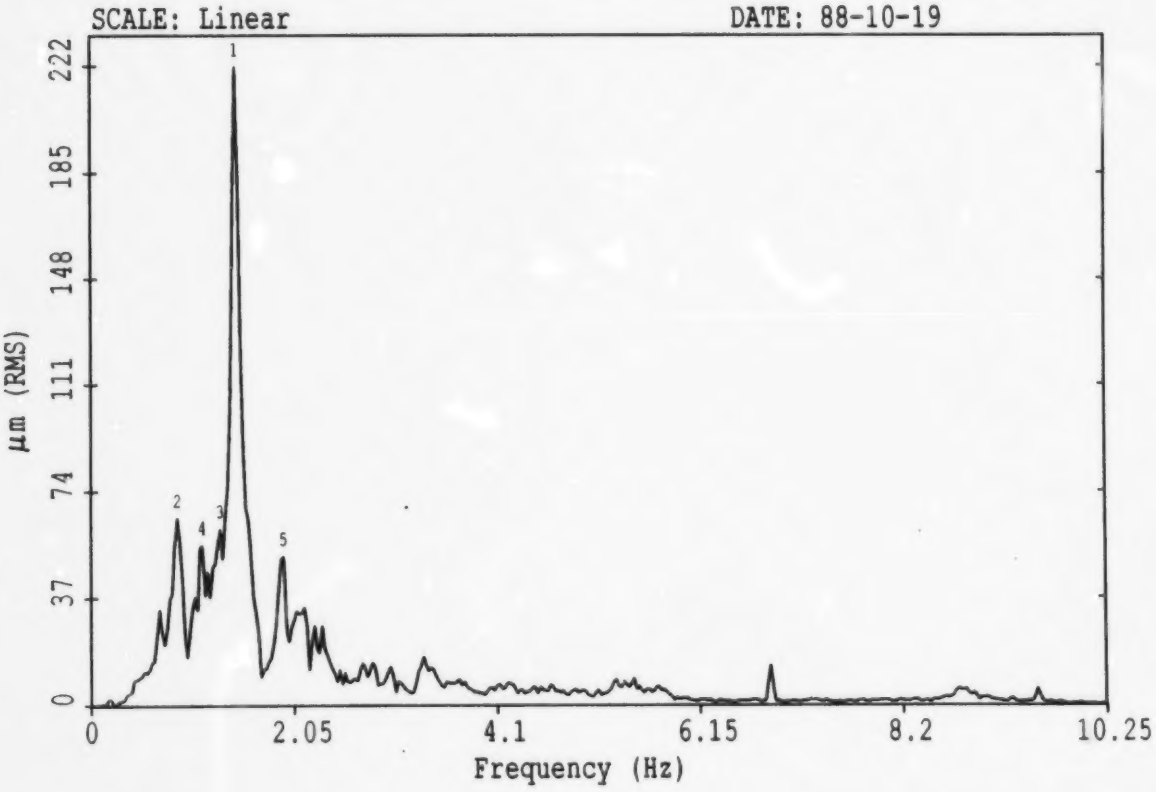


FIGURE A84

Lambton U3 Main Steam & Reheat Lines

SIGNAL : Elev. 600 East-West
PROCESS CONDITION : Cold Reheat - South Line (position: E)

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.462	55.57
2	8.846	30.45
3	1.154	28.36
4	1.923	27.28
5	5.820	26.17

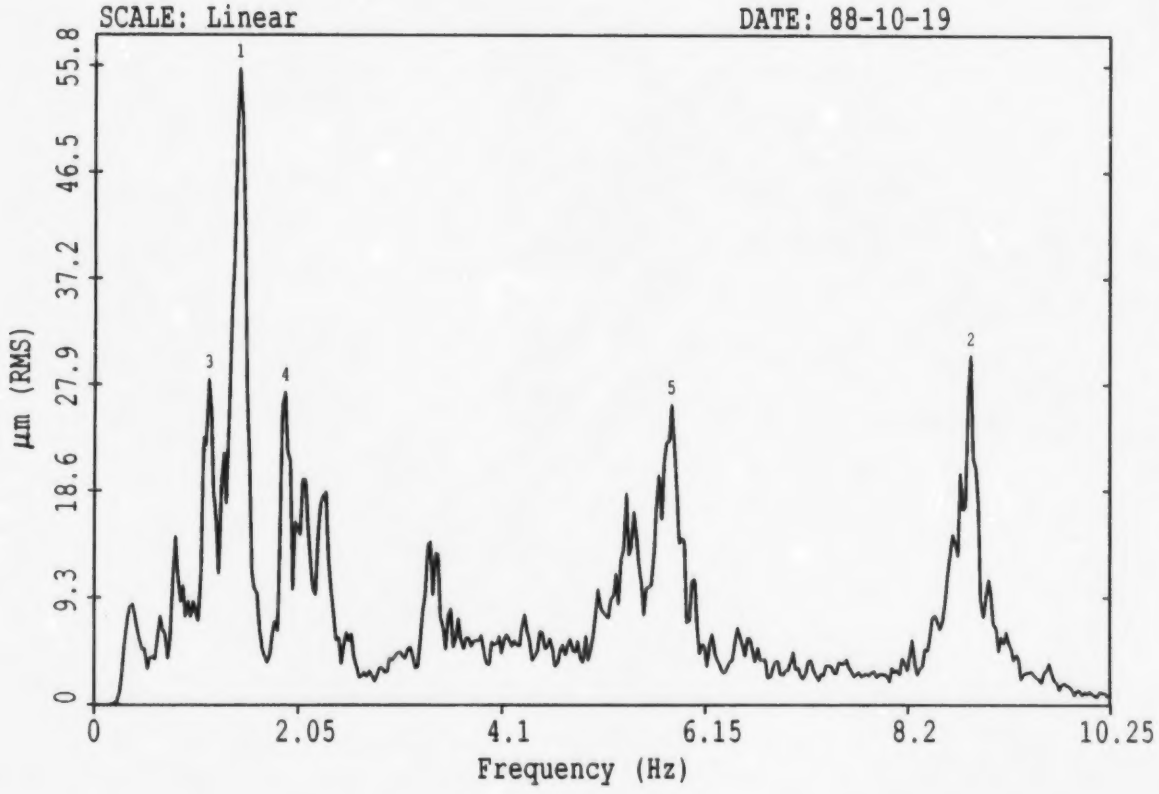


FIGURE A85

Lambton U3 Main Steam & Reheat Lines

SIGNAL : East-West
PROCESS CONDITION : Loop Pipe # 4

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	20.70
2	1.641	10.50
3	1.256	10.28
4	8.461	6.30
5	1.820	5.35

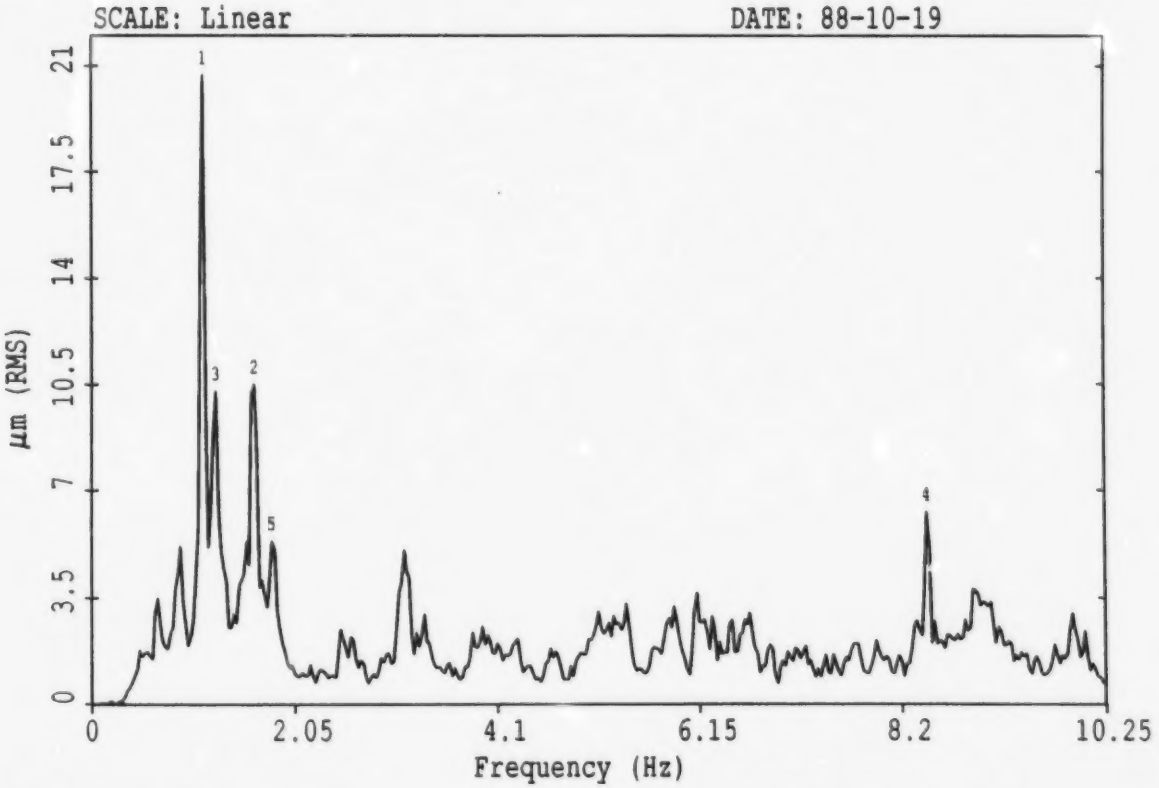


FIGURE A86

Lambton U3 Main Steam & Reheat Lines

SIGNAL : East-West
PROCESS CONDITION : Loop Pipe # 3

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	20.38
2	1.231	16.42
3	1.615	13.70
4	1.487	5.26
5	1.769	3.42

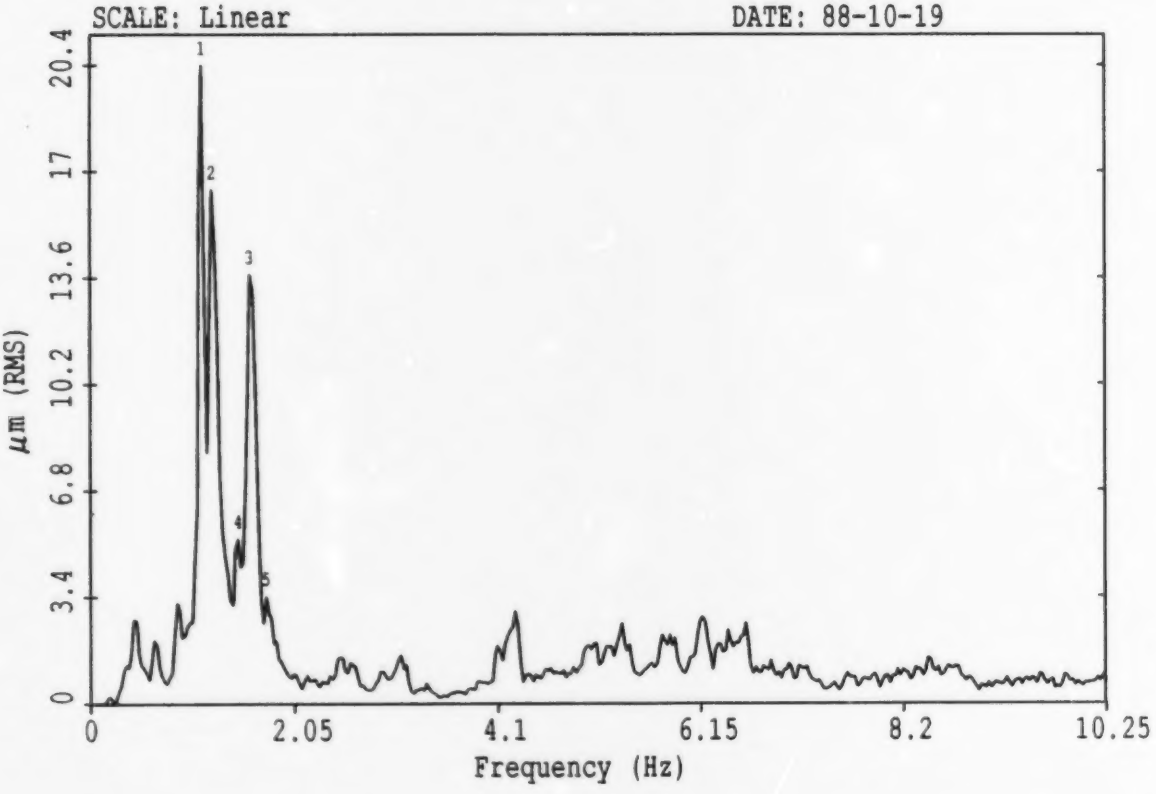


FIGURE A87

Lambton U3 Main Steam & Reheat Lines

SIGNAL : East-West
PROCESS CONDITION : Loop Pipe # 2

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.128	15.46
2	1.256	8.45
3	1.641	8.32
4	1.590	6.74
5	6.179	4.52

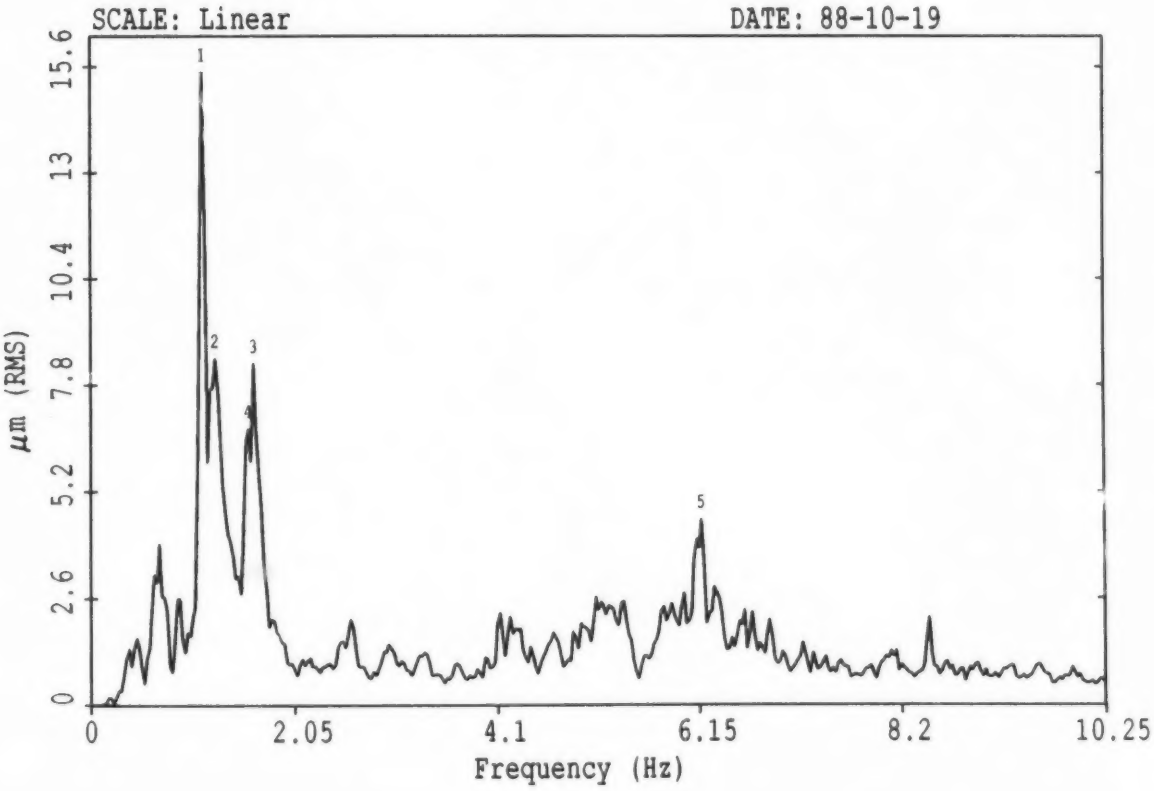


FIGURE A88

Lambton U3 Main Steam & Reheat Lines

SIGNAL : East-West
PROCESS CONDITION : Loop Pipe # 1

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.256	16.62
2	1.128	13.70
3	6.615	13.26
4	6.128	13.25
5	6.769	11.85

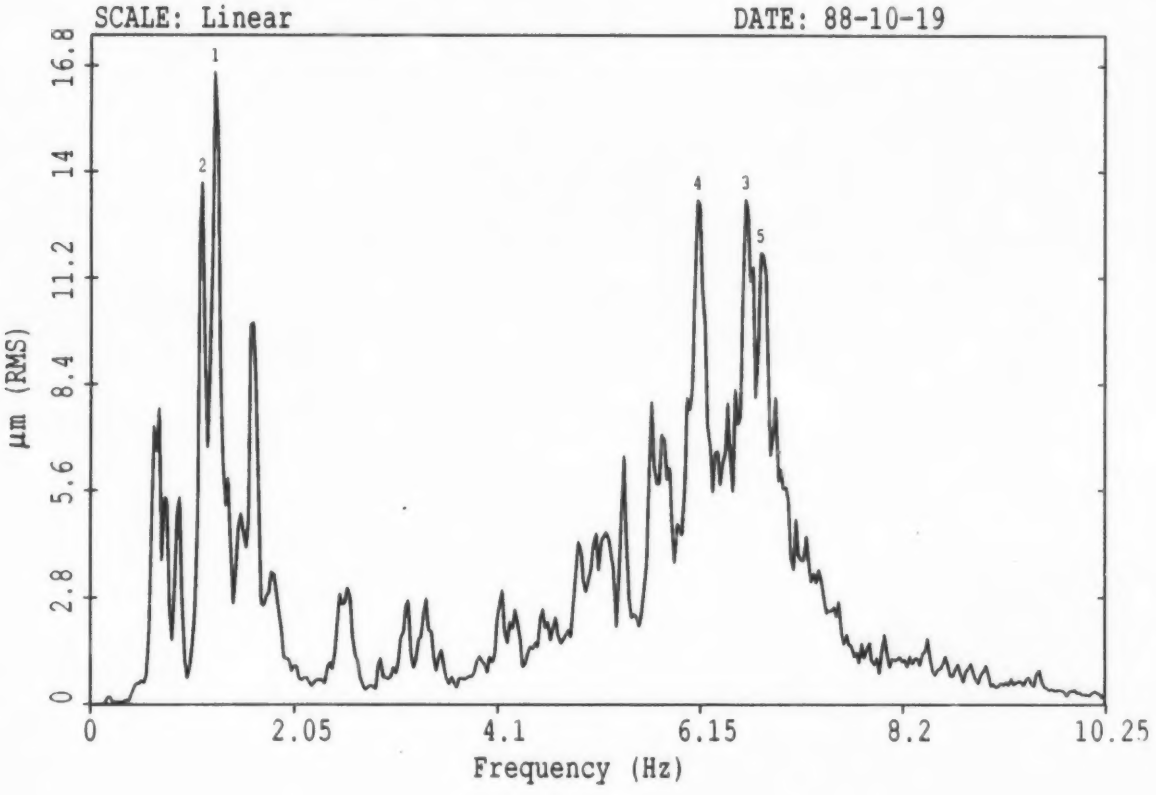


FIGURE A89

Lambton U3 Main Steam & Reheat Lines

SIGNAL : North-South
PROCESS CONDITION : Loop Pipe # 4

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	1.820	19.92
2	3.205	17.96
3	3.949	17.86
4	3.846	17.69
5	3.359	17.47

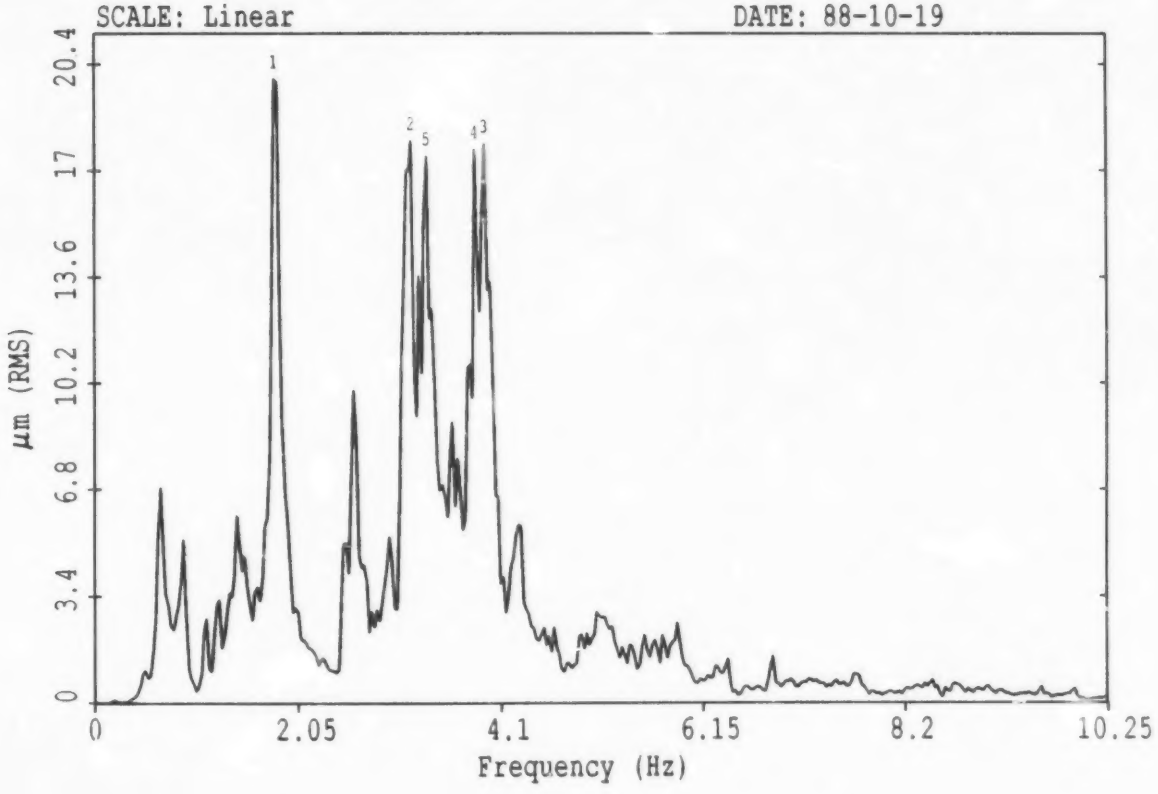


FIGURE A90

Lambton U3 Main Steam & Reheat Lines

SIGNAL : North-South
PROCESS CONDITION : Loop Pipe # 3

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	6.385	33.73
2	6.436	27.57
3	5.974	12.46
4	6.590	11.71
5	1.846	10.54

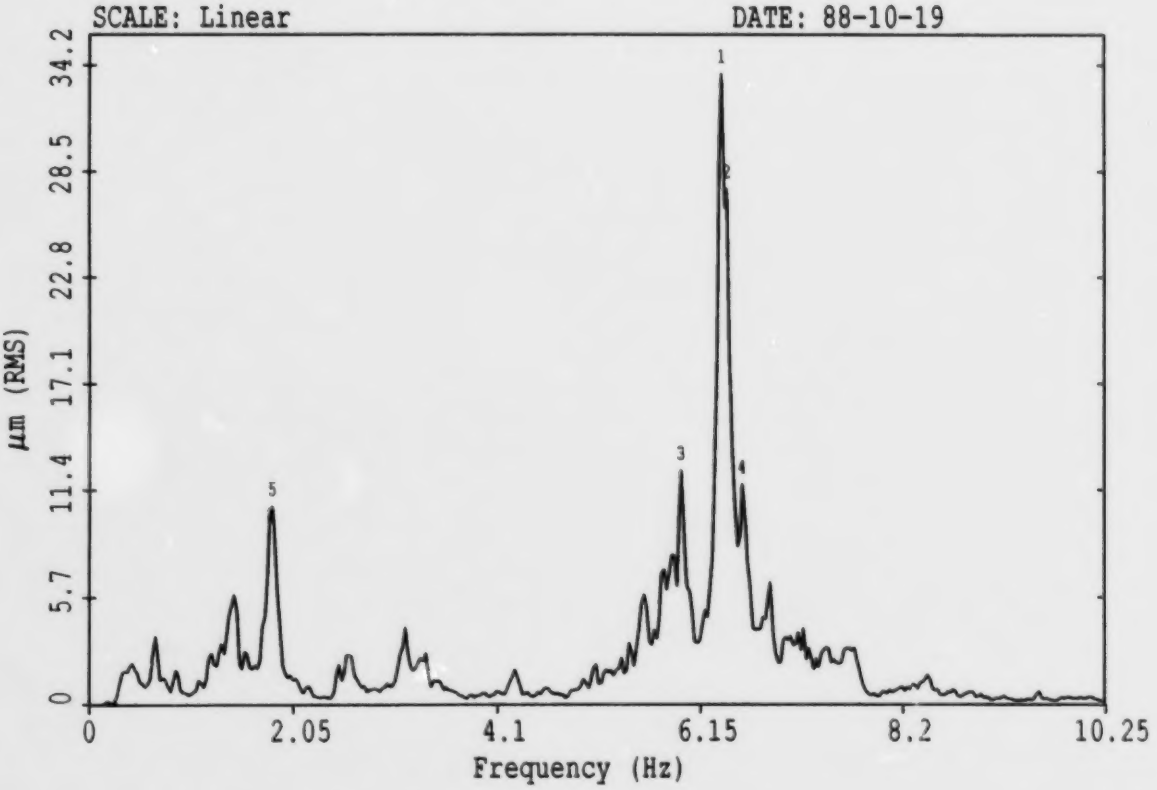


FIGURE A91

Lambton U3 Main Steam & Reheat Lines

SIGNAL : North-South
PROCESS CONDITION : Loop Pipe # 1

PEAK NO.	FREQUENCY	AMPLITUDE (μm rms)
1	2.590	42.16
2	2.513	37.76
3	1.872	28.20
4	1.820	28.09
5	2.410	16.47